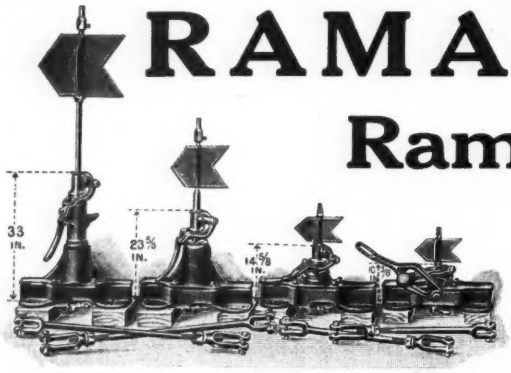
Railway Maintenance Engineer

me 13 | CHICAGO: Transportation Building NEW YORK: Woolworth Building | JUNE 1917 | CLEVELAND: Citizens' Building WASHINGTON: Home Life Building | Number 6

RAMAPO



Automatic Safety Switch Stands are Manufactured only by the

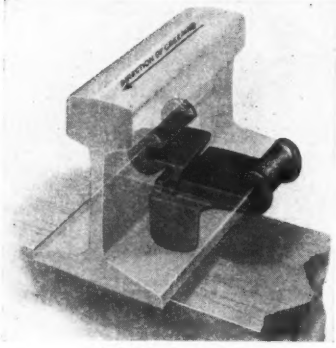
Ramapo Iron Works

Write for Descriptive Catalogues on
Switch Stands, Switches, Frogs, Guard Rail Clamps, Etc.

Manganese Track Work a Specialty.

Ramapo Iron Works Main Office: HILLBURN, N. Y.
WORKS: Hillburn, N. Y., and Niagara Falls, N. Y.

RAIL ANTI-CREEPERS



THE P. & M.

EFFECTIVE — EFFICIENT
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THE P. & M. CO.

RAILWAY EXCHANGE
CHICAGO

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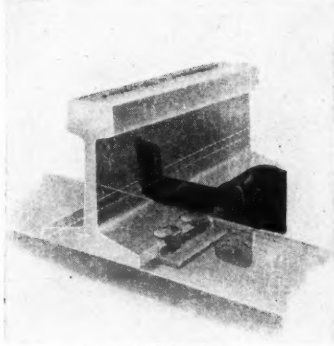
ST. PAUL
SAN FRANCISCO
DENVER



THE VAUGHAN

ESTABLISHED 1882

THE WEIR FROG CO.

Track Work of Rail and Manganese Steel Construction

CINCINNATI --- --- --- --- --- OHIO

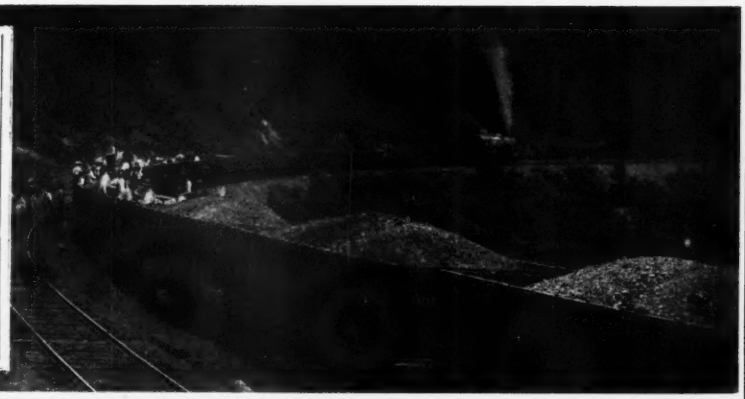
SOME CURVE

Some curves are necessary, but are you sure the high curve in your Maintenance Cost is one of them?

Many railroads have found our products not only insure good track and smooth running trains, but aid to take the curve out of high Maintenance Cost.

Our 127-page treatise on switches, frogs, curves, rail braces, etc.; will prove an aid to busy Maintenance officials.

THE CINCINNATI FROG & SWITCH CO.
CINCINNATI OHIO

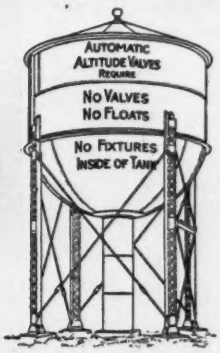


America's Greatness Is Due To American Railroads

Golden-Anderson Patent Automatic Cushioned Water-Regulating Valves up to 24 in.

A POSITIVE WATER SUPPLY
DUE TO

Golden-Anderson Automatic Cushioned Controlling Altitude Valves



For automatically maintaining Uniform Stage of Water in Tank, Reservoir or Standpipes. Doing away with the annoyances of Freezing and Float Fixtures inside or outside of Tanks. "Three Ways of Closing These Valves."

1st—Automatically by Water.
2nd—By Electricity. if desired.
3rd—By Hand.

May also be arranged to automatically close when a break occurs in the mains. When necessary they may be so connected as to "work both ways" on a single line of pipe.

Valves Cushioned at all times by air and water
No water hammer or bursting mains
"NO METAL-TO-METAL SEATS"

"Hosts" of "References"

Golden-Anderson Valve Specialty Co.
1200 Fulton Bldg. **Water and Steam Specialties.** **PITTSBURGH, PENNA.**

For Pumping From Deep Wells Against Total Heads Up to 400 Feet

Goulds Fig. 1454 Deep Well Working Head is a popular type of pump for pumping from deep wells, for watering tank service and for general water supply in railway buildings. This pump is built for capacities up to 56.3 gallons per minute and is furnished for direct connection to electric motors or with pulleys for belt drive. It is compact and exceptionally strong. The frame and base are cast in one piece. The stroke is adjustable (6, 8 or 10 inches, and 12, 16 or 20 inches) by changing the wrist pins in the driving wheels. The gears are machine cut from the solid.

Goulds Fig. 1454 Deep Well Working Head gear connected to electric motor.

This pump is only one of many types of

GOULDS PUMPS
FOR EVERY SERVICE

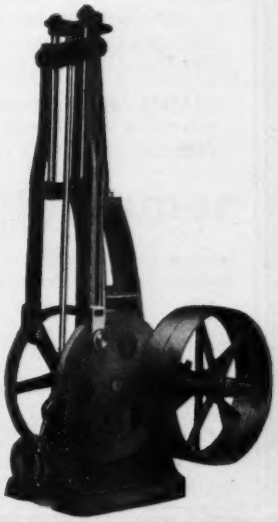
suitable for use by railroads for filling watering tanks, for use in construction work, for power plants, fire service and many other applications.

A complete set of bulletins describing our line of Centrifugal, Triplex, Deep Well, Diaphragm, Rotary and other types sent on request.

Write our nearest office.

THE GOULDS MFG. COMPANY

Branch Houses	Main Office and Works	*District Offices*
Boston	Seneca Falls	Pittsburg
New York	N. Y.	Atlanta
Philadelphia		Baltimore
Chicago		Houston



Goulds Fig. 1454 Deep Well Working Head with tight and loose pulleys for belt drive.

AMERICAN

The Cheapest Large Capacity Deep Well Pump When All The Costs Are Considered

The ability to deliver most water from a deep well at lowest total cost, when all first costs, attendance costs and upkeep costs are considered, is the quality that is creating the demand for the "American" Deep Well Turbine Centrifugal Pump.

It will deliver a far larger quantity of water from a deep well of a given size than any other type of pump, except the air lift, and will maintain a much higher efficiency than any air-lift system in existence.

This pump is very compact in design, requires little attendance, and can be relied upon to meet every requirement of water-supply service.

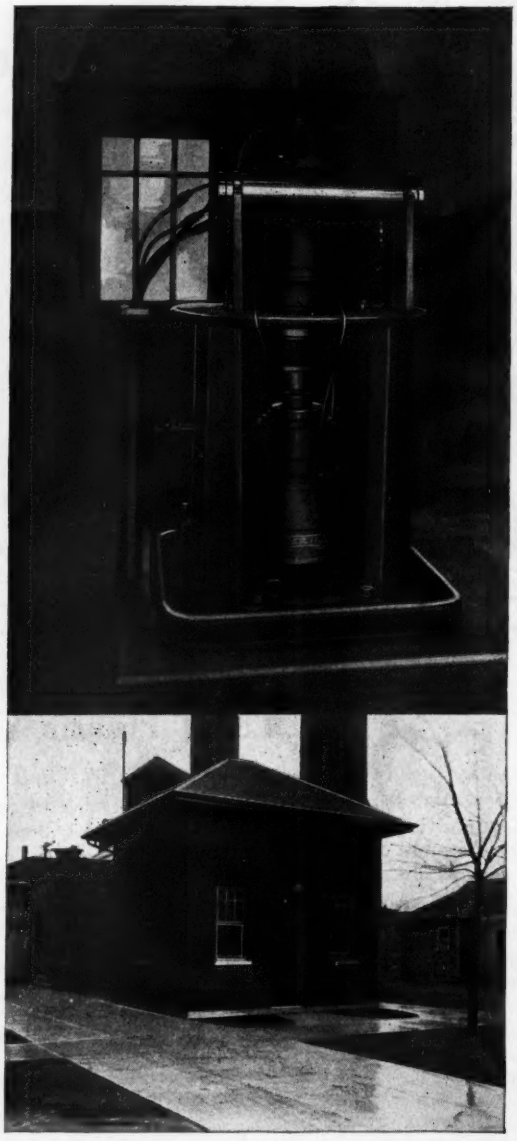
The accompanying illustrations show an installation of one of these pumps in the City Waterworks at Morris, Illinois. Note the small space occupied by the pump and the small size of the pump house.

The pump is a 15-inch, six-stage turbine with the bowls located 190 feet below the surface, and has a 40-ft. suction pipe attached below the bowls. Pump is direct connected to a 37½-h.p. vertical type Lincoln Electric, 3-phase, 60-cycle, 220-volt, slip-ring motor and operates at a full-load speed of 1,150 r.p.m.

This pump is designed to deliver 400 g.p.m., against a total head of 185 ft., and discharges into a reservoir from where the water is pumped into the mains by other equipment. A careful test of this pump shows that it maintains an efficiency of 66 per cent.

Consider the small size of this pump and then note the quantity of delivery, the high head and the efficiency maintained.

Meeting successfully the most difficult pumping conditions is what is building the reputation of this turbine.



Catalog 132 describes it.
Write for it.

The American Well Works

General Office and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.

Sales Agencies:

New York City	Birmingham, Ala.	San Francisco	Edmonton, Alta.
Philadelphia, Pa.	Kansas City, Mo.	Salt Lake City	Calgary, Alta.
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St. Paul, Minn.	Lincoln, Nebr.	Dallas, Texas	Montreal, Que.
St. Louis, Mo.	Denver, Colo.	Artesia, N. Mex.	

Save time in filling your tenders
Prevent damage from Water Hammer

WITH THE

POAGE Style H WATER COLUMN

An Instantly Adjustable Spout

Quicker work in filling tender tanks is possible with the Poage Style H. Water Column equipped with the Fenner drop spout.

A vertical range of five feet and a lateral range of three feet make accurate spotting of the tender unnecessary.

The spout works equally well with tenders of different heights.

The spout avoids the usual winter troubles in cold climates. It has a non-freezable telescopic joint. This is entirely open. There is no packing of any sort. Yet it does not leak or waste a drop of water.

Quick Closure Without Water Hammer

Even on high pressure water mains, the Poage Style H. Valve is closed quickly without danger to the mains from water hammer. The flow is cut down 85 per cent very rapidly and the remaining 15 per cent more slowly.

Tests by the University of Illinois have shown that this principle provides the quickest closure and makes water hammer impossible.

Investigate the Poage Style H. water column. Give it a thorough trial.

Manufactured exclusively by

The AMERICAN VALVE & METER CO.

Cincinnati, Ohio

Capacity 50,000 Gals. Height 20 Ft. to Bottom
Chicago & Northwestern Ry.

STEEL TANKS
For
RAILWAY SERVICE

Build For The Future

The Corporations which show the most enviable dividend record over a period of years are those which have followed this policy.

A Steel Tank Is An Asset That Does Credit To Your Judgment

Chicago Bridge & Iron Works

SALES OFFICES
Chicago, Ill. — Charlotte, N. C.
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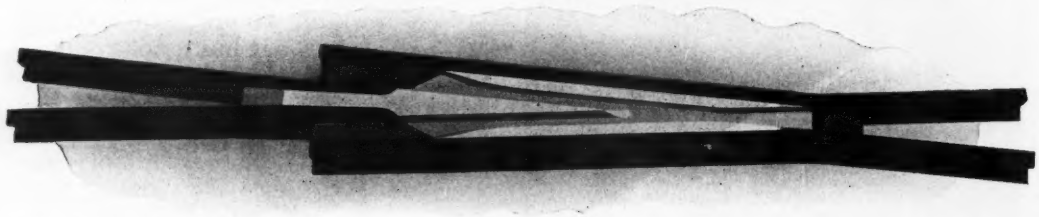
SHOPS
Eastern: Greenvile, Pa. Pittsburgh Dist.
Central: Chicago, Ill.
Canadian: Bridgeburg, Ont.

CABLE ADDRESS
"Chibridge Chicago"

Other REASONS WHY You Should ADOPT the M.T.S. Standard Rail-bound MANGANESE STEEL FROG

In preference to any other design



4. The Manganese Steel casting takes the severe side strains within itself, as it extends well past the throat and includes the flare—thus the bolts do not come loose. This was a feature of our Class A-1 frog, first introduced in 1901, and extensively used ever since, with records of 13 years' service under the heaviest main-line traffic.
   For the heel rails and at the extreme toe end high tensile bolts are used.
5. The full section of the rolled steel wing rails is preserved throughout, without notching or planing, giving full strength and facilitating repairs.
6. The straight and parallel lines in the design insure accurate fitting of the parts.

Detail drawings of this frog, of any standard angle, from No. 4 to No. 20, gladly furnished upon request.

Look up this space in last month's and next month's Maintenance Engineer for ADDITIONAL REASONS, or write us for full particulars.

MANUFACTURED BY
WM. WHARTON JR. & CO., Incorp., Easton, Penna.

"Keep Each Rail In Its Place"

Each rail length is a unit and should be controlled as a unit—not as a line of connected rail lengths.

The Thomas Rail Anchor Tie Plate is a real rail anchor in both directions and controls each rail length between its limits of expansion and contraction.

Each tie can become a rail anchor. The burden of resistance need not be upon a few ties in one direction, but can be distributed upon all of the ties, and the rail is held in both directions.

Some devices control by traffic alone and are effective one way only.

The Thomas Rail Anchor Tie Plate is effective both under traffic and non-traffic conditions.

"The Wail of the Rail" is an interesting booklet on the subject of Rail Control. Write for a copy.

Chicago Malleable Castings Co.

General Office and Works—120th St. and S. Racine Ave.

West Pullman, Chicago

Thomas Rail Anchor Tie Plate

ROBERT W. HUNT
JAS. C. HALLSTED
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"HUNT INSPECTION"

Will help Railroads operate with greater safety and less expense

SPECIALISTS IN INSPECTION OF
Rails and Fastenings
Structural Material and Cement
Timber and Timber Preservation

Chemical and Physical Laboratories

ROBERT W. HUNT & CO., Engineers

General Office, Chicago

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KILBY
FROG & SWITCH
COMPANY

Birmingham, Alabama

Manufacturers of

Frogs, Switches,
Crossings, Etc.

Manganese Track Work
a Specialty

IF YOU WANT TO SAVE TROUBLE

IF YOU WANT TO CUT THE COST OF CROSSING UPKEEP 80 PER CENT

IF YOU WANT TO SAVE THREE-FOURTHS OF YOUR CROSSING RENEWALS

You will find the solution in installing the

EYMON CONTINUOUS CROSSING

A single lever (either electric or hand), operated from the tower, **closes the gaps**—the source of trouble and great expense with old style crossings. **The Eymon Continuous Crossing** will save the equivalent of its first cost every two years. Maintained for less than $40.00 per annum. Snow and ice does not affect its operation. Actual service records of several years' duration back our statements. Write for them.

THE EYMON CONTINUOUS CROSSING CO.
MARION, OHIO

Where Other Remedies Failed

INTERNATIONAL
STEEL CROSSING FOUNDATIONS

Have Made Good

FIVE years of experience under all kinds of steam and electric railroad traffic have proved the worth of our steel crossing foundations. Our claims have been demonstrated in actual service under the heaviest rolling stock operated at speeds up to seventy miles per hour.

Maintenance has been reduced about 75% because our steel foundations keep crossings to line and surface.

Built up crossing frog life has been doubled because racking on wooden ties is obviated, and bolt and filler block breakages become a thing of the past.

Perfectly balanced riding is also produced. Consequently track maintenance on each side of crossings is also decreased. You cannot afford to let another season pass without determining for yourself that our claims are based on fact.

Our prices are reasonable and our deliveries are prompt. Write today for a remedy for your cases.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

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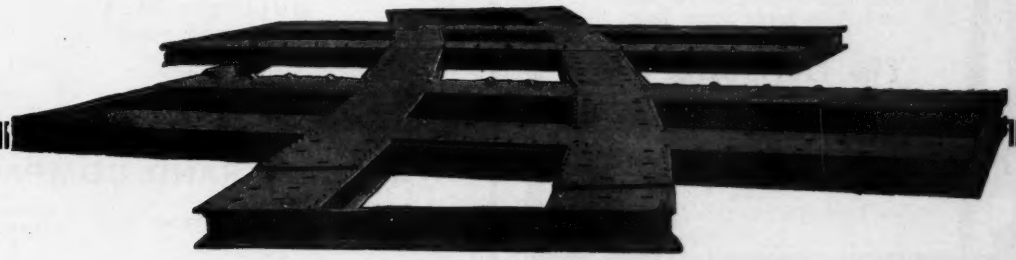
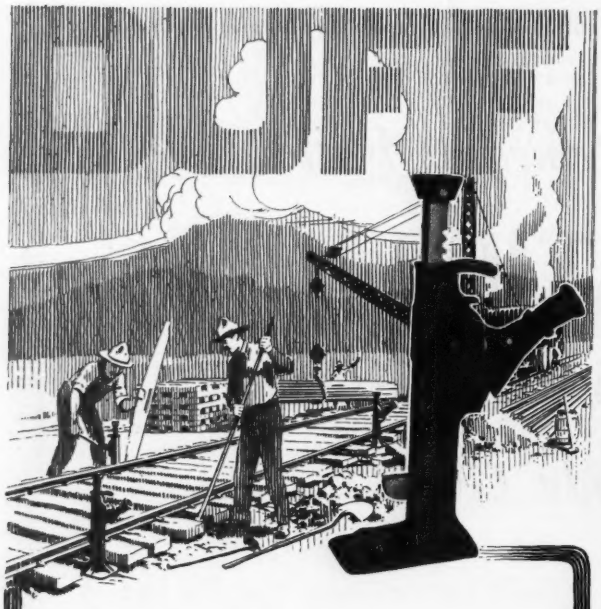




The Leading Railroads Of The World Recognize Duff Jacks As Standard

For nearly thirty-five years the railroads of the world have recognized Duff Jacks as the standard of safety and efficiency.

Standing squarely behind the performance of each Jack is the name and reputation of the largest Jack manufacturers in the world and the most accomplished Jack engineers in America.

GENUINE BARRETT JACKS

Whenever and wherever there is lifting to be done—in track surfacing, repairing, ballasting and constructing, and on every big bridge job—railroad engineers universally have come to depend upon Duff Jacks.

The 150-page Duff Jack catalog, illustrating the most complete line of Lifting Jacks in the world, will be sent immediately upon request.

Makers of

Genuine Barrett Track Jacks
Genuine Barrett Car Jacks
Genuine Barrett Emergency Jacks
Duff-Bethlehem Hydraulic Jacks
Duff Journal Box Jacks
Duff Ball Bearing Screw Jacks
Duff High Speed Screw Jacks

The Duff Mfg. Co.

Established 1883

PITTSBURGH, PA.

New York Chicago Atlanta
San Francisco St. Paul

"IMPERIAL" TAMPERS

A four tool outfit (gasoline driven compressor)

ON THE SANTA FE

"IMPERIAL" TAMPED FOR SAFETY

"Imperial" Pneumatic Tie Tampers effect an evenly and firmly tamped roadbed. Track settlement is uniform and far less than that of hand tamped track. Water pockets and careless tamping of indifferent workmen are eliminated.

The roadbed is safer—less likelihood of broken or spread rails.

On the basis of comparative cost "Imperial" Tampers have made hand tamping obsolete. They accomplish equal progress with fewer laborers—they "take the place of the men you cannot get."

BULLETIN 9023
will be sent on request

INGERSOLL-RAND COMPANY

11 Broadway, New York — Offices the world over — 165 Q Victoria St., London

58-TT

When a Thousand-Ton Train Takes a Cross-Over

Over it flashes at a forty-mile clip dealing a thousand sledge-hammer blows on the switches and frogs, causing heavy thrust and vibration, stretching track bolts and loosening nuts—if they're the old-fashioned kind. That means constant inspection and tightening of joints—an expense and a constant source of trouble. Today, however, progressive roads may avoid this by using

Roller Lock Nuts for Crossings Frogs and Switches

These nuts have the unique feature of self-tightening under vibration and automatically taking up the bolt stretch. They may be spun on track bolts with the fingers and tightened with an ordinary wrench. The nut locks automatically—a little steel roller "does the trick"—and only a strong wrench pull can unlock it. Once unlocked, it is readily removed without damaging bolt threads. Track bolts and Roller Lock Nuts can thus be re-used indefinitely. Don't imagine they're a costly novelty. Hundreds of practical tests on bad stretches of track have demonstrated their economy and efficiency. Roller Lock Nuts will help to cut labor and maintenance costs. Let us give you details and send samples.

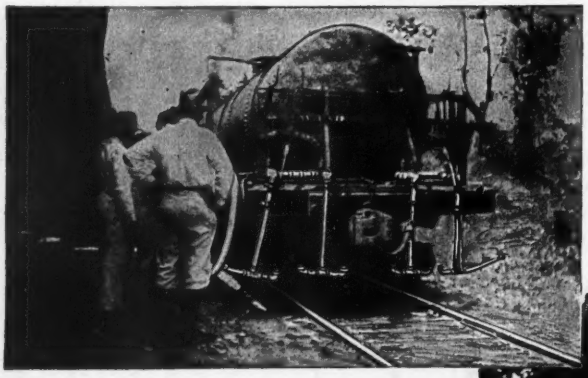
Roller Lock Nut Company, Inc.
61 Broadway New York

To Kill Weeds You Need just one thing

The Cattle-proof Chemical

TRACKOLINE

Your weed problem is simplicity itself. You have the right of way. Nature will supply the weeds. Your men can rig a sprinkler tank. There is no expert knowledge required. You don't need a Doctor of *"Weedology"* to insure you a clean track, all you need is TRACKOLINE, "The Weed Killer."



Trackoline Equipment on a Panama Railroad

There is, however, one important fact which railroad men must bear in mind—Get on the job early. Don't wait until the sturdy weed family dispute the ownership of your right of way with you. Remember, if you kill the little seed you will not have any weed, but will have greatly reduced expense for your weed fighting campaign.

Weed burning. Hand weeding. Forget 'em, but don't forget these two things which are necessary to ensure you clean tracks and lean expenditures.

1st. Get the little weed in its tender youth.

2nd. Get "Trackoline." "Go to it" early, and Knock out the Seed Family, so there will be no Weed Family.

Trackoline the highly concentrated chemical, which does just what it was designed to accomplish, "Kill every weed, top, root and seed," which not only assures an absolutely clean track for the balance of the season, but greatly retards the growth of even the most hardy vegetation the following season.

Expert Maintenance officials know Trackoline to be a *real* weed killer, and more—they know it is absolutely harmless to live stock, causes no injurious results to rails, ties or track superstructures, and needs no costly equipment for effective application.

TRACKOLINE

The killing of germinating seeds, means the terminating of weeds. Trackoline assures them both, as is clearly shown in *Trackoline Tracts or Facts on Clean Tracks and Lean Expenditures,* for the Prevention of Vegetation.

Name .....

Address .....

Protective Materials Corp., Vanderbilt Bldg., New York.
Please send me full information on Trackoline "The Weed Killer," and explain how we can save money on weeding our track problem.

Protective Materials Corporation

Vanderbilt Bldg., 51 E. 42d St., New York

Mudge & Company

RAILWAY EXCHANGE
CHICAGO

Burton W. Mudge, President — Robert D. Sinclair, Vice President

Company Business Memorandum

File No. 606
At Atchison, Kansas. *Date* May 28, 1917.

Mr. Sinclair:

Here at the Factory today - we held a demonstration of the 'Safety First' Center Hung Inspection Car. It was great.

The idea of a four-wheel, load-in-the-middle inspection motor car, that occurred to us several years ago, has certainly taken substantial form in a fine way. Railroads need this car. It answers every inspection requirement. It cannot but strike favorably every official interested in safety.

Several pictures 'in action' were taken. Four views are enclosed. They are all good.

Notice particularly the picture I have marked No. 1. The car is handled on and off the track by one man. It is plenty light.

In No. 2 the car is being started. A three-stride push and it is under way. It's easy to mount and no danger.

No. 3 is a distant view - car going down track - it is operating on kerosene. This picture brings out the center hung feature - shows how the seat board and low hung weight is evenly balanced between all four wheels.

No. 4 is a close-up. It shows ample room on the seat board and plenty of loading space on platform. Control levers, brake, also grab irons and safety side rails are handy.

This car is sure to rapidly replace the speeder type which has the weight over one rail.

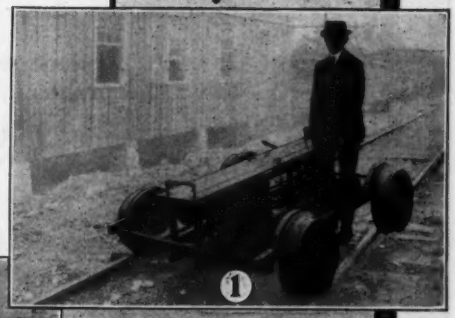
Let's arrange to give every interested operating official in the country an opportunity to judge its merits.

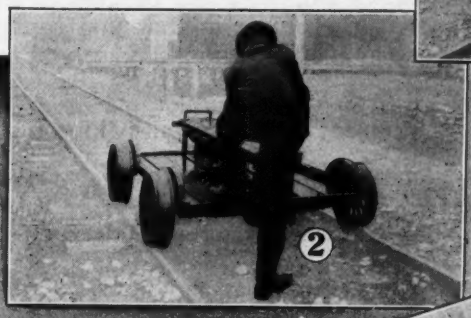
Mudge

CHICAGO MUDGE

Motor Car Safety for Your

Roadmasters
Supervisors
B & B Foremen
Valuation men
Signal men
Line men
Claim Adjusters
Patrolmen
Inspectors





Reduce the Loading Time

Both railroads and shippers are beginning to find it necessary to conserve railway equipment by reducing the idle-car-time.

It can't be done with push trucks, but Electric Trucks will solve the problem.

Buda Electric Trucks handle increased unit loads; they decrease the running time. Each truck does the work of from four to ten men.

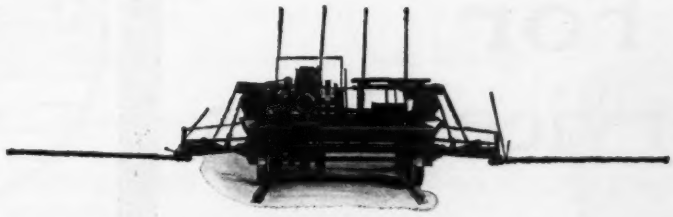
Our industrial efficiency engineers will be glad to tell you how to solve your particular problem so that you can get a great deal more work done in every working day, so you can do more work with fewer men.

Tell us what your problem is and we will help you solve it.

THE BUDA COMPANY

608 Railway Exchange Bldg.,
Chicago

"Buda Products Serve the Best"



Cut The Cost Of Track Work By Cutting Weeds With A

FAIRMONT MOWING MACHINE

A prominent roadmaster on the C. M. & St. P. says—after two seasons of experience—that the Fairmont Mowing Machine saved $4,000.00 a year for his road.

How?

By doing *more* work in one day than *sixty* men with scythes. This was easy, because the Fairmont Mower cuts weeds and grass on both sides of right of way at once, only requires three men to operate, and keeps 500 miles of track perfectly trimmed.

In another thirty days your weed and grass cutting campaign will begin. How will you do it, use the old inefficient scythe, or will you save $4,000.00?

Let us send you complete information.
The coupon brings it.

FAIRMONT GAS ENGINE & RAILWAY MOTOR CAR CO.
423 N. Main St., FAIRMONT, MINN.

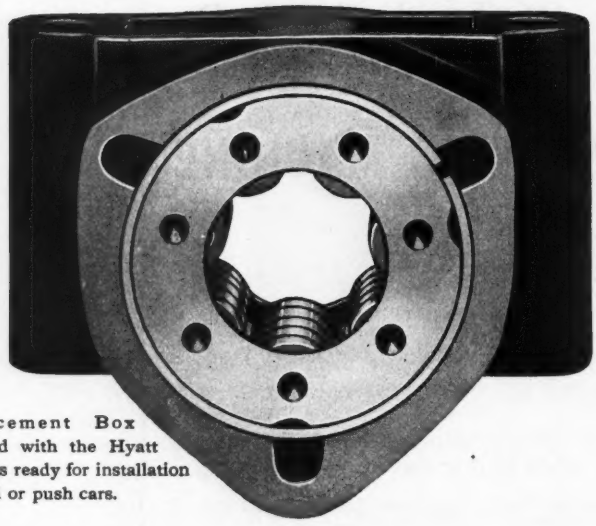
Gentlemen:
Mail me complete information on the FAIRMONT MOWING MACHINE.

Name .....

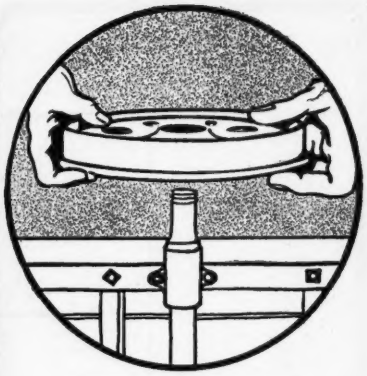
Address .....

Title ..... *Road* .....

HYATT BEARINGS For R·R·Service Cars

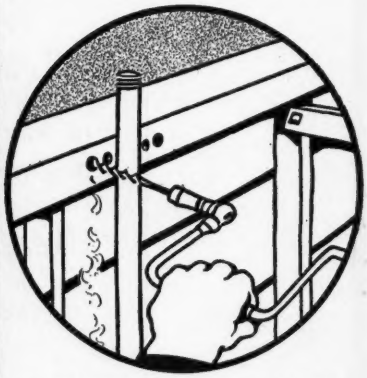


Replacement Box equipped with the Hyatt Bearings ready for installation on hand or push cars.

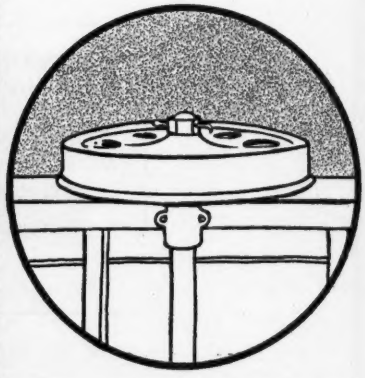


First you take off the wheels.

Then remove the old-fashioned plain bearing box.



Next you drill the new bolt holes in the car sill.



Put the easy operating Hyatt Bearing Replacement Box in position and tighten the bolts.

It Certainly Is Simple

All you need is a wrench and a brace and bit.

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(Signed) Secretary W. G. McAdoo.

May 14, 1917.

Railway Maintenance Engineer

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Constructive Maintenance Work

In handling his work a foreman too frequently considers only the immediate problem confronting him and makes the necessary repairs without endeavoring to ascertain and remove the causes of the trouble at the same time. Thus, one man will continue to resurface a section of his track which is subject to continual settlement, while another will not only do this work, but will also construct a small ditch to improve drainage and remove the cause of the trouble. If a foreman will study his work he will be able to eliminate much labor for himself, while at the same time maintaining the property under his supervision in proper condition. Every foreman has problems the proper solution of which is as important to the successs of his work as the more complicated studies to the higher officers. If he realizes that a careful study of his work may enable him to save much labor and to direct his efforts more intelligently he will have made a long step forward in the conduct of his duties.

Eliminate the Interpreter

With the possible exception of some Mexicans and a few negroes, very few laborers are now being used on track work who have not had previous experience. Since the opening of the European war immigration has been almost at a standstill. In consequence only an insignificant number of foreign laborers is being recruited for work of any kind who have not been in this country for three years or more. While many of these men speak little or no English, they have had enough experience to understand all orders concerning work with which they are familiar. At the same time, a considerable number of them can make themselves understood to persons conversant only with English, and in a gang of any size there would ordinarily be enough laborers of this class to make their troubles known to the foreman. As a consequence the need of an interpreter in a track gang has ceased to exist, and were it not for the pressure brought by the employment agency for whom he acts as a sort of agent, this supernumerary would have been eliminated long ago. These men as a rule are parasites, preying alike on the men and their employers. Although they represent a long-established institution, the sooner they are discharged the better for all concerned.

Improvements in Housing Conditions

While far from universal, there has been a great improvement in the character of the camps provided for maintenance of way laborers on many roads during the last three or four years. Railway men have realized that the old box cars were far from satisfactory; public health authorities have criticized them frequently, and civic organizations have given this subject attention from the standpoint of the laborer. However, the greatest force for the betterment of living conditions has been the shortage of men and the realization by students of this subject that improved living conditions are an important consideration in securing and holding men. This has led to marked improvement in the character of the quarters furnished in cars and in camps for floating and also for section laborers. However, great as the improvement has been, much still remains to be done along this line. To show what has been accomplished, as an indication of

progress and for the information of those roads which have not yet considered this subject, we desire to present descriptions of improved buildings and cars which have been provided for this class of men within the last few years in the August issue. For this purpose we solicit descriptions of installations of this character with photographs and approximate figures of cost, and will pay our space rates for all accepted and published. For use in the August issue it will be necessary that we receive these descriptions before July 10.

PROTECTING SURPLUS MATERIAL

THE railways are now ordering rails for delivery early in 1919 and are paying $40 per ton for them, or $10 more than two years ago. Spikes are now costing $80 per ton as compared with $30 in 1915, and bolts have increased from $36.40 to $80 per ton in this period. These facts are typical of conditions in the steel market and indicate the necessity of conserving all materials to secure the full service from them and to eliminate unnecessary loss of all kinds. The foremen are the employees of a railway upon whom the responsibility for co-operation of this character rests ultimately in large measure. They can do much to extend the life of materials by giving them proper attention while in service and by taking special precautions to see that they are not subjected to unnecessary abuse. Also, it is usually necessary for each foreman to carry a certain amount of reserve material in addition to that held in the division general storerooms. This stock should not only be protected against loss by theft, but should also be kept under shelter if of a character which deteriorates from exposure to the weather. Even though the one-half keg of bolts which a foreman may have on hand is relatively insignificant in itself, it becomes an important item when multiplied over the system, and the loss from rusted materials of this sort may be considerable. The interest of the company can be fully conserved only when each man does his part to eliminate unnecessary losses.

KEEP MAINTENANCE NORMAL

IT is common knowledge that the railroads of France have suffered a serious loss of efficiency because of their failure to maintain their equipment and roadway in proper working condition. A similar state of affairs exists in Germany and it has been predicted that the eventual collapse of this power may be largely caused by the failure of its transportation system.

War results in waste, extravagance and neglect. Under a pressure to accomplish the primary object of defeating the enemy, all else becomes secondary. In the part which the American railways will play in carrying on the war, as in times of peace, the conduct of transportation will always be the most important activity, but in times of urgent need the movement of trains will so overshadow all other activities that there is serious danger that maintenance will receive only minor consideration.

In consequence there will be a tendency toward inadequate maintenance which will be aggravated by the scarcity of materials and labor. Pressure will be brought to bear to use poor substitutes or to dispense entirely with things considered requisite under normal conditions. Under the pressure of high prices and slow delivery, there will be a tendency to defer tie renewals and to forego the treatment or even proper seasoning of the timber before placing it in tracks. It will also be argued that tie plates, rail anchors and other appliances can be done without until some later date. In bridge and building work there will be a tendency to use timber in place of concrete for sills, retaining walls and in other places where it is unsuitable to the discredit of this material.

To a large extent this state of mind is only an aggravation of that which has existed in the past during periods of financial depression, and the eventual result, if this tendency is allowed to become effective, will be in the nature of an aggravation of the results of periods of deferred maintenance in the past. In other words, it will call for enormous expenditures later when the lines are restored eventually to a normal state of maintenance. Adequate maintenance during the war will be expensive, but it will be cheaper than subsequent restoration, and it becomes the duty of every man in the maintenance department to use his influence to keep the property in first-class condition.

A COMPANY EMPLOYMENT BUREAU

IN studying the labor problem now confronting the railways, one cannot help but be convinced that one of the greatest handicaps is the way in which the men are hired. When buying materials the railways adopt elaborate precautions to insure that they get the quality desired. They require that the goods conform to specifications prepared carefully with a view to the service expected of them. The materials are also subjected to rigid inspection and tests before acceptance.

In contrast with this practice the roads pay little or no attention to the selection of men for their service, even though they spend far more for labor than for all the materials they purchase. Moreover, they often leave the selection of their men to persons not in their service, who assume no responsibility for the character of the men selected.

Not all labor agents are bad, but the system under which they operate is inherently wrong. Although they hire men for the railways, they derive their compensation from the laborers seeking work, who are not, therefore, in a position to resist sharp bargaining methods and who as a result are frequently imposed upon. Furthermore, the more times an agent can fill a given number of positions the more numerous are his fees. This brings his interests in direct conflict with those of the roads who desire permanency of employment at least for the season. This condition is responsible for the frequent transfer of men and of entire gangs from one road to another, each transfer resulting in fees for the agent.

Another fundamental difficulty with the present system is the lack of responsibility of the agent either to the road or to the employees. Until a road exercises some supervision over the hiring of its employees and recognizes that all men, even of the lower grades, are not of equal efficiency, there is little hope for improvement. It is an interesting and significant commentary on the existing methods of handling men in railway service that many of those considered incapable of any but the simplest work a couple of years ago have since developed into expert employees in munition factories and shops under different methods of training. These men are lost to the railways permanently, but others of the same class are still entering the service. It is time that the roads were aroused to the importance of giving at least as much attention to the selection of their men as to the materials which these men are to use. While under the conditions which exist at present it may be necessary to hire all the men who can be secured, the same haphazard methods were followed when there was a surplus of labor.

The railways are suffering in a number of ways from the present methods of recruiting their forces. In the

first place no attempt is made to secure men fitted naturally or by experience for the work they are to perform. Rather all men are hired upon an equal basis and no recognition is given to the more efficient or capable. Each misfit, even at the simplest task, is a loss, while the failure to recognize ability drives the better men into other industries.

Another danger of the present system of hiring labor is the opportunity for collusion between the labor agents and employees of the road and also between the agents and the men hired, particularly with reference to the abuse of transportation to the work. Instances of dishonesty in the maintenance of way department are rare, but a large portion of those which have been discovered have had their inception in conditions leading out of the methods of hiring labor.

All of this discussion points to the organization of a company labor bureau as the solution of the problem. The time has come when the roads can no longer afford to pass the responsibility for the hiring of their employees over to outside parties. Other industries have discontinued this practice long ago and now select their men themselves. The expense of maintaining a bureau for the employment of labor will be offset many times over by the elimination of losses such as those referred to above. The average road can well afford to establish a central employment bureau, in direct charge of an employee of the railroad without any division of responsibility. This bureau should have branches in the more important centers from which the road draws its supply of labor. In this way the selection of the men will be made by those responsible to the employer for their fitness, the incentive for the transfer of these men from one road to another road will be removed and there will be less danger of collusion and irregularities. In brief, the conflicting interests of the labor agent and the road will be merged into a common interest, for the success of the labor bureau will depend upon the extent to which the men hired render satisfactory service.

THE COLISEUM EXHIBIT

IF one desires proof of the educational value of the annual exhibit of the National Railway Appliances Association, held during March of this year in Chicago, he needs only to read the comments of the railway men who attended the last show, published on another page. Probably because this exhibit is held annually and is so readily accessible, many railway men do not fully appreciate its value and the opportunity it presents for busy railway men to familiarize themselves with the latest developments in the materials and devices applicable to their work.

The discussions of the exhibit are of particular interest because of the constructive suggestions they contain regarding ways to make the display still more useful to railway men. As one of the contributors points out, the list of firms exhibiting, although large, is not complete, and one fails to find some important materials on display. Because of their absence railway men are frequently handicapped in their investigations of certain products. Many men can spend but a limited time at the show and they naturally desire to gather the maximum amount of information about those devices or materials in which they are particularly interested. To conserve their time it is highly desirable that the exhibits of a class be grouped together. It is recognized that this concentration of exhibitors by classes has its handicaps owing to the fact that single companies frequently display two or more widely differing types of equipment. It would also force old exhibitors in many instances to accept less desirable space than they now occupy. However, the suggestion has merit and is worthy of consideration.

In a few instances the exhibitors have not realized the importance of placing representatives in charge who are fully familiar with the practical application and service of their materials and devices. Unlike those attending many shows of this general character, where the souvenir hunter is in the majority, the visitors to this exhibit are serious minded railway men looking for information. For this reason wherever practicable the best results are obtained from full-sized exhibits in full operation supplemented by ample records of service. For the same reason the supply representatives should be thoroughly conversant with the practical phases of their products so that they may be able to explain them in detail to visitors and to answer any questions.

In brief, by making the exhibits, individually and collectively, of the greatest value to their visitors, the manufacturers increase the value to themselves. The National Railway Appliances Association has succeeded in this to a marked degree and it is to be hoped that the suggestions contained in these articles will be of service to this Association in making the next exhibit even more instructive than those which have preceded it.

THE USE OF PRE-CAST CONCRETE

ON another page of this issue appears a description of the methods used in one plant manufacturing concrete pipe and other reinforced concrete units for various railway purposes. This plant has been in operation for a number of years and has unquestionably been the source of important economies to the road operating it. Similar results have been secured by other railroads through the purchase of pre-cast concrete units from manufacturers. Success in the use of unit construction, as in any other undertaking, is dependent upon the observance of certain definite economic principles. Unless the concrete units can be manufactured or purchased, shipped to a more or less distant point, and erected by a number of men sent there to do the work cheaper than a concreting crew with its outfit can travel to the job, unload its equipment, do the work and reload its plant, it is difficult to justify the use of unit construction.

In general unit constructed concrete is a more uniform product and has a better finish than concrete cast in place, and there may be cases where unit members will produce a better structure. On the other hand, there are other situations where monolithic construction is highly desirable and this can only be secured in unit construction with difficulty.

The most important requisite for the success of the pre-cast system is the degree of standardization that can be carried to a point where but a small number of kinds of units are required. If this is not the case too large a stock of forms will be required and the work of the manufacturing force will be so diversified that the workmen cannot obtain the degree of skill possible where the same operations are repeated over and over. A high degree of skill on the part of the workmen also implies continuous employment by a permanent force.

Another matter that must receive careful consideration is the cost of transportation. Unit construction cannot compete successfully with built-in-place concrete where the haul is excessive, assuming that an adequate charge for the transportation is added to the cost of the pre-cast work. However, some of the large manufacturers of pre-cast concrete have overcome this difficulty by establishing plants at various industrial centers where they are within easy reach of large districts.

LETTERS TO THE EDITOR

RATING MEN BY ABILITY

RIO, LA.

TO THE EDITOR:

I have been working as a track foreman for the last 26 years and have had the good fortune to be so placed that I was allowed to rate my men according to their experience and capacity for work. I was also permitted to assign the men a given task for a day's work, allowing them to quit when the work was completed. I ran a steel gang for a lumber company in the South for about 10 years, and by following this policy I was enabled to accomplish as much in 8 hours as most foremen could have done according to ordinary methods in 11 hours. I found that every man would work hard in order to receive the highest rate of pay as well as to quit as early as possible. Under this system I was not compelled to drive the men at all and could devote all of my time to see that the work was being done right.

F. E. TATE,
Section Foreman, New Orleans Great Northern.

BALLAST COMBINATIONS

HUNTINGTON BEACH, CAL.

TO THE EDITOR:

Crushed stone, even though the particles are of uniform size, undoubtedly constitutes the best material for ballast; but in gravel or other materials the specifications usually provided for the grading of concrete aggregates apply nearly as well for ballast, the aim being to have each successive size fill the voids of the next in the mass until a permeable compactness is obtained.

Crushed or angular matter, though ungraded, forms a bond, while aggregates of smooth or rounded particles must be either confined at the base to prevent rolling or be graded in such a manner that the stress is properly distributed and the shock absorbed, which latter may be secured only by an approximately correct gradation.

That gravel ballast should be absolutely clean is one of the pet commandments of the maintenance decalogue; yet, if the proportion of round, smooth boulders predominates, it is really far better to introduce a filler of fine sand or a binder of loam or clay than to support the track on a pyramid section of these rolling stones.

In two salient cases known to the writer, where a liberal amount of clay was contained in the gravel mass, the results were surprisingly gratifying. Thirty miles of a Montana railroad were ballasted with a pit gravel that contained fully 15 per cent of pipe clay, deeply yellowed with oxide of iron, and altogether a very unpromising ballast prospect. However, as no other ballast was readily available, and as the soil in the track was of a kind that settled readily when wet, the clayey matter was applied in the hope that the roadbed might at least be improved enough to permit the speeding of stock trains, the road's most important traffic. The surfacing and lining required since that time on the track ballasted with the "forlorn-hope" gravel has been far less than that demanded on any equal stretch of standard roadbed on the line. Unfortunately, the pit was exhausted, so that a more general application was not feasible. Clay and gravel have usually a co-operative faculty of cementation that renders the track immovable and almost impervious to the action of water.

A Colorado road, subjected to heavy tourist traffic, embraced a two-mile stretch of track lightly ballasted with a mixture of small boulders and decomposed granite on an alluvial and unstable subsoil. A green or careless foreman (or, perhaps, one wiser than his generation) raised the entire stretch, and, being short of material with which to top-dress his work, discovered some deposits of clay that closely resembled the original ballast in color and he trimmed the track with a blanket of the clay probably two inches thick. Naturally, he was discharged. Two years later work trains were hauling quantities of the same clay to other sections to serve the identical purpose; for through two hard seasons the clay-dressed track had retained an invariable surface and line, as well as the original shoulder form.

Where ungraded ballast of round units is laid upon diffusible soil it may even be advisable to mix the lower few inches thoroughly with the subsoil. Otherwise, as the newly-made bed settles into the soil the two will "weave" at the base as the ballast units are compressed into the soil and the latter rises into the consequent voids. If the incorporation is artificial, instead of the stones "skidding" to place on a hard-dressed pan, they will settle uniformly and firmly and the formation of troublesome water-pockets will be minimized.

On the majority of ballasted track the slope given the sub-grade is insufficient. The lesser slope is defended by many despite its slower drainage, owing to the lessened tendency of the ballast to "slough" or slide down past its established toe-line on the berme; but as this movement takes place only when the slopes are lubricated with water or mud, and as the action of the latter is diminished by the faster draining of the increased slope, treatment by the extreme of either method would seem to be "robbing Peter to pay Paul." Under average conditions of soil, comparisons will quickly demonstrate the preferability of the slightly-increased slope, but soils differ so widely that they must be handled according to their characteristics.

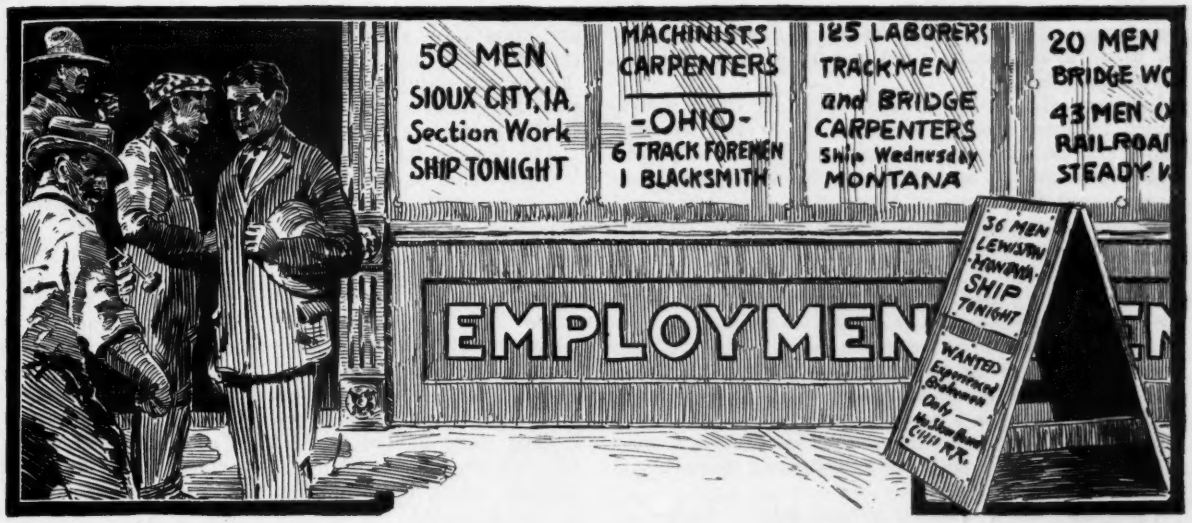
Whether mixed with a little dirt, placed on any reasonable degree of slope or applied heavy or light, a little extra care and labor used in selecting and placing the larger aggregate toward the base will pay big dividends. This practice requires but little extra labor, as ballast discharged from dump-cars naturally tends to separate, the finer portions forming the apex, while the boulders roll to the base. If handled with forks instead of shovels and a little care is taken in selection it may easily be placed in the track in like order.

While burnt gumbo is excellent ballast, it is almost prohibitive because of the fuel necessary to its proper preparation. Smelter slag, though condemned on many roads because its flinty points and edges "chew" the ties, serves splendidly if the voids are filled with sand or fine gravel and a superimposed strata of an inch or more of the same material is applied between the ties and the heavier matter.

Coke breeze or fine cinders churn and powder beneath the vibrating ties, but, when proportioned with slate or clinker masses, they retain form and stable surface. They are also excellent for mixing with dirt and tamping in on earth-ballasted tracks and around headblocks, etc. Decomposed granite serves the same purposes equally well and it also forms a good cushion over slag or coarse ballast.

There are endless combinations of two or more different materials that jointly give splendid results, while in many cases either component affinity used singly would be but slightly better than "natural dirt."

JOE RODMAN.



DEFECTS IN THE METHODS OF HIRING MEN

Timely Discussions of One of the Principal Causes for the Shortage of Laborers in Railway Work

REGARDLESS of the differences of opinion respecting the causes for the scarcity of maintenance of way laborers all agree that a serious shortage now exists. It is also evident that these conditions will prevail for a considerable period in the future, if not indefinitely. It is, therefore, highly important that the railways study the causes which have led to these conditions and adopt measures to remedy those which are within their control.

If any progress is to be made the railways must admit frankly that some of the methods of handling labor in the maintenance of way department in the past have not been all that could be desired. The following articles describe defects in the methods of hiring laborers which have had an important effect on the character and number of the men now available, particularly for track work. These articles also offer constructive suggestions for the improvement of these conditions. Other articles in succeeding issues will discuss practices in the operation of commissaries, in the housing of men and in working conditions, all of which have an important influence on the supply of labor.

WHY NOT AN EMPLOYMENT DEPARTMENT?

By E. R. Lewis,

Assistant to General Manager, Duluth, South Shore & Atlantic, Duluth, Minn.

In general, railways obtain their labor through private agencies. Each company has its individual labor problems which militate against co-operation or combination among railways in the matter of obtaining labor. A railway must get its men from among the residents along its lines, or from agencies which draw recruits from markets tributary to cities located on its lines; or it must suffer the handicap of payment of transportation for the men over foreign lines. Each railway must take into consideration the wage scales of industrial concerns drawing labor from its available markets. Most of these competitors are patrons of the railway, and more often than not pay more for the labor they employ than the carrier can. For this reason a railway serving large mines or automobile concerns can rarely pay as low wages as a railway serving agricultural districts.

Employers of labor north of Mason and Dixon's line, including a number of railways, sent agents into the southern states last year to recruit negro laborers, thousands of whom were hired for track work, and sent north at considerable expense. The chief engineer of a railway prominent in this undertaking asserts that he had no experience which would permit him to judge the capabilities of the negro as a track laborer; but he was able to testify that southern negroes enjoy railway travel. Of the many men hired, very few went to work for his company, and most of those who did accept railway service, found other employment in a few days. From the maintenance standpoint the project was considered a failure in this case.

Although railways are restricted to a limited number of labor markets, the movement of labor is not restricted, especially in times of industrial activity, when a laborer with a taste for travel can get transportation with ease from one city to another by accepting service from labor agencies whose patronage covers wide and overlapping territories. A laborer from Chicago hired to work in Calumet, Mich., took a suit case belonging to another passenger. Within a week the laborer and suit case were located in Butte, Mont. In times of industrial depression, and in winter especially, unemployed men congregate in large cities within access of employment agencies, which are enabled largely, through these periodic migrations, to furnish men to their railway patrons. The labor agent's procedure is to advertise on his own bulletin boards and through the daily press stating the number of men wanted, the destination, a description of the work, the rate of wages, the cost of board and the terms on which transportation is furnished. The applicant is furnished with a ticket bearing his name, number, the service proposed, the destination, wage and various other details, and is usually afforded personal conduct by the agent until he entrains. He is often accompanied to his destination by a representative of the labor agency or the employer and turned over to the person under whose dierct charge he is to work. Occasionally boarding trains

are held in cities until the agencies can furnish a full complement of laborers, during which time the men are put to work as soon as hired and are moved when the recruiting is finished.

Laborers who do not speak English are often accompanied by interpreters who make the service arrangements and remain with the men on the work. These professional interpreters are looked on with suspicion by foremen and frequently by the men as well. This lack of confidence is a very good reason for getting on without them, as they are usually in the wrong place when most needed.

Private labor agencies which specialize in the furnishing of track labor sometimes contract with railway companies for furnishing board to the men. If the operation is on a sufficient scale to permit purchases of food supplies in wholesale quantities, there is a handsome profit in normal times for a concern with a suitable organization and sufficient capital, as is evidenced by a number of fortunes accumulated almost exclusively through such operations.

There are other ways of getting labor. Gangs are sometimes transferred intact from one road to another, through arrangements based on knowledge of the whereabouts of laborers and the probable length of service afforded. There is labor which regularly accepts summer service on track and winter employment in cities, and which can be depended on to appear in early spring on receipt of transportation supplied direct by the company. There are also native or resident men in nearly every community which are periodically available.

It is suggested that, inasmuch as railway companies are large employers of labor of many kinds, including periodical, as well as permanent, track labor, the hiring of employees should receive the undivided attention of a company department or bureau of employment organized under company officers to get the best possible results at the least cost. Every department of a railway needs employees. Why not provide all employees through one company employment department just as all materials are provided for all departments through the purchasing department? It has been found worth while to systematize the purchase of materials. Is it any less important to systematize the hiring of labor? Is there any reason for allowing the payment of $5 per week board by track laborers to a boarding contractor when every railway has its own catering department? By taking over the details of this business of hiring and keeping all its employees, by eliminating middle men and haphazard methods, by registering all employees and applications in one system of files under one department head, a railway company should be able to reduce the cost of acquisition, insure prompter renewals, improve the class of employees and lessen the amount of transportation issued. This department would, of course, require branch offices in various labor centers to supply different divisions of the road. There is nothing chimerical or impracticable in this suggestion. It is hard common sense, applied to a field of endeavor heretofore largely overlooked in the otherwise admirable organization of railway operation. There is all the difference between haphazardism and system in a well ordered labor department.

It is impossible to divorce the present labor scarcity from the war conditions of which it is a result, or to make any suggestion for improvement in obtaining labor without considering not only our past and present, but our expected future problems based on the experience of the nations which have been at war for nearly three years. Since the war started our labor has become increasingly scarce, and has sought employment more remunerative than that offered by railways. From the first emigration of foreign laborers, mechanics and others, in answer to their countries' calls to the colors to the present national problem of conscription, the railways have been more or less directly affected by the constantly increasing labor shortage.

The present labor problem is a national one. Labor is required for agriculture, for mines, for manufacturers, for transportation. Competition for labor by all these industries has only resulted in increased wages. Recruiting for army and navy will accentuate this shortage. It would seem that the labor problem, being country-wide, admits only of a solution having a similar scope. The United States has a certain total number of laborers. To obtain the best possible service from this labor for the various purposes for which the nation most needs it, the labor must be distributed proportionally among the industries necessary to national welfare. Among these industries the lines of transportation are of vital importance. Unless labor for their direct and indirect needs is obtainable they cannot perform the service expected.

THE COMPANY AGENCY IS BETTER

By P. J. McAndrews,
Roadmaster, Chicago & North Western, Sterling, Ill.

The man whom many have been pleased in the past to call the unskilled track laborer has to-day become the skilled operative in munition works and other factories, and has proven that through a little painstaking instruction he can equal many who have heretofore been classed as his intellectual and mechanical superiors. Because it is apparent that a complete change must be brought about in the methods of handling this class of labor if we are to meet the difficulties which will unquestionably grow rather than lessen in the next few years, it is well to outline some of the measures that can be taken before it is too late.

In the past the laborers employed in track maintenance were plentiful, and even those whose duties brought them in close touch with their men, paid little or no attention to their welfare. The private labor agency was permitted to exploit them; the housing and general care of the men was scarcely given a serious thought and little attention was paid to the matter of arranging work so that steady employment might be given to experienced men. The interpreter or padrone system was fostered by the floating of large gangs from railroad to railroad and from one part of the country to another, and little or no effort was made to foster and build up a permanent track maintenance force.

Railroad managers who were considered efficient in operating problems were lax, to say the least, in looking after the needs of the track department, seemingly depending wholly upon the local officer to find and care for his labor supply, and giving scant consideration to recommendations for better methods of securing and caring for labor of this floating character. In any discussion of the track labor problem of to-day some thought need be given to the belief of many that the fundamental trouble is the seasonal plan of employing track labor, and, although conceding the impracticability of the permanent force plan in the most northerly parts of the United States, it can be demonstrated that such a plan is workable on 60 per cent of the railway mileage in this country.

The hiring of track labor has been placed commonly in the hands of private agencies, although in recent years some railroads have organized agencies under the direction of their officers which have been successful. There

are certain abuses in connection with private agencies which were patent to all observers when labor was more or less plentiful, such abuses consisting chiefly in charging exorbitant office fees from laborers; unauthorized promises to interpreters or gang leaders that resulted in trouble with roadmasters and foremen when the gangs arrived at the work; misrepresentation of working conditions, kind of ballast, length of time to be employed, probable wage increases, etc., and a disregard of the fitness of the men for the kind of work they were being employed to perform. Private agencies are in business to secure fees, and in order to get these various subterfuges have been employed that were deserving of adverse criticism.

It is therefore the belief of many that agencies directly under the control of railway maintenance officers are in every way more desirable than private agencies for many reasons. As company agencies are the direct representatives of the railroad officers who are to handle the labor on the work and do not charge office fees, they will have the confidence of the men from the beginning. Such agencies must of necessity truly represent conditions of employment, and to retain the confidence of those following railroad work will take an interest in the men after they are hired and should be able to keep sufficient forces available at all times and by proper organization be in a position to hold gangs on their lines and by transfers from division to division as necessary. Such agencies, being in close touch with the experienced department heads, can place certain classes of labor where the work is such that they are best fitted for service.

Private agencies sometimes promise certain individuals places as interpreters who are not fitted for the duties of such positions, while some interpreters endeavor and often succeed in making the men dissatisfied with one job, with a view of securing greater concessions for themselves, and if their demands are not granted will take the gang to another company, thus earning fees for the employment agent.

The company agency having in its employ trustworthy men of the nationalities commonly employed on track work can avoid the hiring of unfitted interpreters and instead choose as leaders men who may be trained as foremen. There are many men who have become excellent foremen after a little painstaking effort by superior officers.

Private agencies have in many instances been closely allied with the interpreter system, using the candidates for the positions of interpreter to collect the men while the agent received the fees and turned the men over to the railroad foremen. The laborers felt that they were practically robbed and went to work with a desire to get even, feeling (with some justice) that there was a conspiracy between the labor agent and the railways to exploit them.

It would seem that the railways would receive ample returns for the expense of operating their own labor agencies through a more satisfied feeling among the men, a more stable supply of labor and the complete elimination of abuses so commonly met with where private agencies have been delegated to secure the labor supply.

The only advantage that may be claimed for the private agency is that it saves the railways a small expense incidental to the organization of their own labor departments, and that while labor was plentiful they usually were supplied with some kind of men, although it is well known that the roads handled a lot of non-revenue passenger business since the losses of men shipped to jobs often reached 75 per cent of the total shipments. The loss would frequently be even greater during harvest time, and is such a well known abuse of the private system that it has been virtually taken for granted and, while it will not be claimed that a company agency would be immune from some loss of labor in shipment, no one will doubt that greater care would be taken to guard against this evil.

Where necessary to ship laborers from centers of employment some system of granting a bonus for certain terms of service would tend to induce men to remain on the job, and, if added to a bonus system, permanency of employment could be arranged, the reason for the labor agencies would not hold, and the company labor department could readily secure a supply of men to fill vacancies that will always be found to occur from well known causes.

The company agency would be in a position to supply not only track laborers, but could also provide men for other departments, such as roundhouses and shops. The agency should be a unit of the company employment bureau, and, to be efficient, such a bureau should be organized to care for the laborer from the time he is hired until he is properly housed on the job in a bunk car or boarding camp and continue its observations to insure that the camp surroundings are sanitary, that proper food is furnished at standard prices and that no exploitation is permitted either by private boarding camps or unscrupulous individuals in any capacity.

The question of private boarding camps here enters the discussion and attention may be properly called to the fact that where private companies have operated boarding camps, the controlling factor has too often been profit for the boarding company to the detriment of the railway's interests. These abuses have been permitted to the extent that men have continually left service and the labor agent was profiting by sending men out to fill the places of men who got sick "on the firing line." Such conditions have existed in the past, and because labor was fairly plentiful the roads "got by" with it. Today things are different.

All large railway systems should have their own labor agencies to handle not only track labor, but other classes which are becoming increasingly scarce, and such agencies should be under the control of and handled by men of known integrity, whose duty it would be to study the needs of the laborer, as well as the interests of the railway, and by honest methods and fair treatment remove the prejudice against railroad employment, which has been the result, to a great extent, of abuses inherent to any system of private labor agencies.

The question of wages must be met as conditions change, and the railways will handle such matters in the future as they have heretofore, but serious thought need be given *now* to the question of securing and retaining a labor supply. Such evils as the allowance of extra hours to increase the compensation of laborers, working (or pretending to work) on Sundays at increased rates with the same end in view, with other uncalled for and unnecessary concessions to laborers and interpreters of foreign gangs, are unfair methods of competing for a labor supply and too much cannot be said in condemnation of them.

It should be the policy of all companies to deal fairly with their laborers, pay them a rate that equals that paid for common labor in other kinds of work, taking into consideration such valuable concessions as free cars to live in and free fuel, and provide proper housing and working conditions.

We must meet the issue squarely. Track labor in common with other classes of labor is becoming increasingly scarce, and all practical railway men must admit that safe track is essential to successful railway opera-

tion and also that track maintained to the highest possible standard is a most economical feature. To maintain good track good men and a lot of them are necessary.

Local conditions must be considered and met with the necessary measures, but it would seem that permanency of employment in so far as practicable, making of the trackman a skilled laborer as in the future he must be, the use of machinery wherever possible and the training of the men in the use of such machinery; teaching men efficiency and fitting them for promotion and also fitting the foreign laborer for citizenship through improvement of his environment, with good housing and fair treatment will go far toward solving the labor problem.

FAIR TREATMENT IS ESSENTIAL

By J. W. Powers,
Supervisor of Track, New York Central, Oswego, N. Y.

The question may be asked, how is it possible to maintain track and accomplish the same amount of work with a large reduction in force? It is not possible to accomplish the same amount of work with the methods formerly employed, and in some cases work that can be deferred should be allowed to pass, but all important work should be done, perhaps as well, and, in some cases, better than it has been in former years.

To accomplish the desired results it has become necessary to devise new methods and to put into operation all the labor-saving appliances it has been possible to secure. Therefore, one of the effects of the shortage of labor has been the adoption of power-driven appliances to supplant labor. Some of these appliances are only in an experimental stage, but they deserve hearty support and sympathetic co-operation not only for the results they may produce directly at the present time, but because of the further improvements to which they may lead.

There are, however, many labor-saving devices which are beyond the experimental stage and are coming into universal use as rapidly as possible. Among those which may be enumerated are ditching, rail loading and rail laying machines; automatic tie tampers and motor cars. The last named proves a big economic factor in saving the time of the men. They are also of inestimable value in securing and retaining them and supply a means of rapid transportation in event of wrecks or other emergencies.

Another method of reducing the shortage of labor is that of distributing the work which is now crowded into a few summer months over a longer period and by the adoption of uniform forces, where climatic conditions will permit. That this method could be more universally adopted is the opinion of many who have given the track labor problem careful consideration. Thus the forces would be maintained on a more uniform basis which would result in securing more efficient men by giving them steady employement.

As in other departments, there are certain practices which are followed in securing, housing and handling maintenance of way laborers, which have been unchanged for many years regardless of the constant decrease in the supply of men. A method generally employed for securing laborers is through private labor agencies. By paying a fee to the agency the laborer could obtain work which in former years might be difficult to find unaided. But at the present time there are numerous complaints from all over the country of the inability of such agencies to secure competent men. It is claimed that many of them are charging exorbitant fees and are not satisfied with reasonable profits, but resort to questionable methods. These prove to be a hindrance in procuring experienced laborers who will secure work elsewhere, and in consequence the men furnished by many labor agencies at the present time are frequently the culls of the labor market.

The majority of men concerned with the handling of labor are agreed that a company labor bureau would give much better results. A foreman should also be given permission to employ and discharge the forces allowed him. Under such methods it is often possible to obtain laborers of exceptional ability, whose qualifications are known to the foreman, and thus improve the quality and quantity of work performed.

The advantages and disadvantages of interpreters are well known to roadmasters and foremen, and the majority are of the opinion that an interpreter should not be employed. Most of them have proven inefficient and unreliable and they are usually a hindrance to the expeditious and economical prosecution of work. A large number of railroads employing foreigners have men of foreign birth in their employment who have proven their worth by many years of faithful service, and many of them are competent to act as foremen, thereby securing good results from men of their own nationality.

Provision should be made for educating employees with an opportunity for promotion governed by seniority and ability. Only a small percentage that toil in the various branches of maintenance of way work have the advantages of the employees of other departments whose headquarters are at a terminal or some other large town where all kinds of educational opportunities are available. The former are, in many instances, isolated and deprived of the social advantages which men in other departments enjoy.

Better living quarters should be provided than those now furnished by some railroads. This applies to buildings, as well as boarding cars and camps. Careful consideration must be given to the handling of boarding cars by train crews, and they should have positive instructions that they should not be handled roughly. If men are in cars they should be notified by train crews before cars are coupled on. If the trackmen were accorded considerate, fair and honest treatment by all concerned, it would be a big step in the right direction.

RAILROADS GRANT WAGE ADVANCES

RECOGNIZING that the increased cost of living is making material inroads into the wages paid its employes, a number of railroads have granted increases in compensation to their employees from time to time. In most cases this has taken the form of the definite per cent of increase to employees of certain classes, including all up to a certain maximum rate of pay. The employees whose wages are fixed by contracts, secured through collective bargaining, have been generally excluded from those receiving the wage advances, as the wages of these men are fixed by collective bargaining and are in nearly all cases much higher than the wages of those included in the other branches of the service. An advance of this kind was given to the employees of the Chicago, Burlington & Quincy, which included all whose compensation does not exceed $250 per month. The increase was 10 per cent and includes shop men and all unorganized employees. It was effective for shop men and clerical forces May 16, while for the track forces the time for going into effect was dated back to April 16.

The Northern Pacific has authorized bonuses for "unorganized" employees, which will aggregate about $750,000. This increase in compensation follows an advance

of five per cent made last October, the difference being that the bonus now announced takes in employees whose salaries run up to $3,000 a year, whereas the increase granted last October applied only to those whose salaries were below $2,000. It is announced that in view of the continued increase in the cost of living, employees in service on July 1, 1917, will be granted a bonus of 10 per cent of their wages between January 1 and July 1, except where service has not been continuous and where the wages of employees are fixed by contracts or schedules made by collective agreement. It is further stated that similar bonus payments will be considered from time to time, as conditions warrant.

The Great Northern granted salary increases to its employees aggregating more than $1,000,000 annually, effective May 1. The percentage of increases ranges from 15 to 25 per cent, depending largely on the basis of compensation, the lower salaried employees receiving the largest rates of increase. The increase affected all clerical forces, including employees in general offices, superintendents' offices, the store department, the station forces, including agents, clerks, yard clerks, warehousemen and similar employees.

The Santa Fe has announced that on July 1, or as near that time as accounts can be made up, those employees not under contracts or schedules and not receiving $5,000 a year or more will be given an additional compensation equal to ten per cent of their salaries or wages earned for the first six months of the calendar year.

A New Rail-Bound Manganese Frog

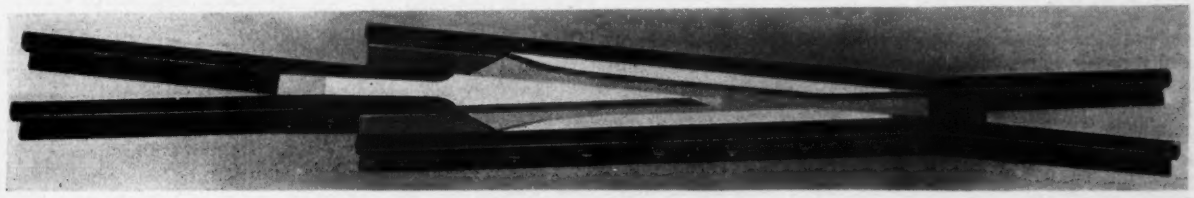
THE Manganese Track Society, which was organized in 1913 by nine manufacturers of special track work, who collectively produce must of the manganese track work used, has recently adopted standards for the design of rail-bound manganese steel frogs of all angles from No. 4 up to and including No. 20, and for all sections of rail from 80 lb. per yd. up and with a width of head of from 2⅝ in. to 3 in. These standards have been prepared for the use of roads which now have no standards of their own and also to replace the wide diversity of designs of other railroads and of the manufacturers.

At the time of the organization of the Manganese Track Society the manganese track work industry was approaching an unsatisfactory condition. Its development had been seriously retarded through the lack of knowledge of the properties of manganese castings by the railways and also by many of the manufacturers. This condition, coupled with the keen competition for business, led to the preparation of designs by manufacturers in which the amount of material was reduced, causing some failures.

Matters were still further complicated by the fact that several railroads attempted to design their own frogs. With the lack of foundry experience the tendency of the railroads was to prepare standards which were expensive to construct and which were objectionable or faulty from a practical, service or manufacturing standpoint.

A study of the situation showed that in addition to the numerous designs of the manufacturers, 18 roads had attempted to prepare designs of their own, all of which were different. This multiplicity of standards resulted in great confusion and in large expense for patterns. Many of the standards were defective in design, some being deficient in section and others being excessive for best results from foundry practice.

In attempting to remedy this situation a committee of the manufacturers and founders was appointed by the society to combine the experience of the track work manufacturers with the special experience of the manganese founders and to undertake the work of standardization. The first work of this committee was to establish definite governing limits for the details of design, to determine the proper dimensions and prepare designs of manganese steel castings for the various track structures, such as frogs, crossings, etc. After the adoption of these limits the committee studied various plans and undertook to prepare a common design for a rail-bound manganese steel frog which would include the desirable features of the many designs then existing. Certain manufacturers had developed details which had been patented to protect the originators in their exclusive use, but early in the work of the committee these patent rights were waived and the special features of each were made available for incorporation in the standards. Each member of the committee redesigned his frog from the information at hand and submitted his plans to the committee as a whole, which then undertook the preparation of the standard which would include all of the desirable features of these designs and to formulate rules to apply it to frogs ranging in angles from No. 4 to No. 20, and for any ordinary section of rail weighing 80 lb. or more.



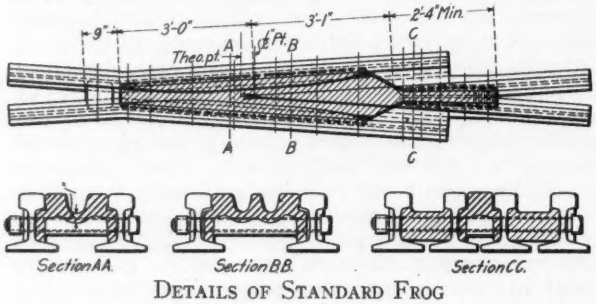
NEW MANGANESE FROG COMPLETE

The design finally adopted includes a number of important improvements over earlier construction. One special development is maintaining of the full section of the wing rail around the manganese insert. In previous construction it had been the very general practice to notch the wing rail at each end of the insert to receive the casting and to hold in it place. This not only required careful machining at the ends and along the line of contact between the wing rail and the casting, but the wing rail itself was weakened by the amount of this notching. With the new pattern the full section of the wing rail is maintained without any shaping of the base or head, thus avoiding not only the weakening of the rail, but the expense of notching it. The wing rail may also be re-

placed more readily with this form of construction. Another advantage results from the fact that instead of being built with a flat angle at the center, the rear face of the casting is straight, permitting more accurate fitting.

Another important improvement is in the design of the casting at the point of flare of the wing rail. In previous designs the manganese casting was commonly spliced onto the heel rails, approximately opposite the point where the flared wing rail receives the blow of the wheels. The continual hammering stretched the bolts at and back of this point with the result that they became loose. This resulted in the loosening of the casting from its connecting rails, creating a point of weakness and early wear. In the new design the manganese casting itself extends across the flange way at this point and is flared to receive the blow of the wheels, with the result that the entire shock is taken up in the casting itself and no strain is placed upon the bolts. The entire design of the frog is such as to permit the use of the standard lengths of frogs and of any lengths greater than those of the manganese castings plus the splicing length.

One of the principal reasons for difficulty with earlier frogs resulted from the attempt to decrease their cost by



DETAILS OF STANDARD FROG

a reduction in the amount of metal inserted. In designing the new frog the first consideration was that of strength and efficient service, and no attempt was made to reduce the cost of construction at the risk of weakness or reduced efficiency. However, the uniformity in design which will follow the scrapping of the large number of old patterns and the substitution of one standard design will result in material economy in construction which will largely if not entirely offset the increased cost resulting from the greater amount of material used.

Complete rules, in booklet form, for laying out the design and also detail drawings of standard angle frogs have been prepared and published by the Manganese Track Society. The Track committee of the American Railway Engineering Association has also incorporated the rules for the design in its report, and they will be printed in the proceedings of this association.

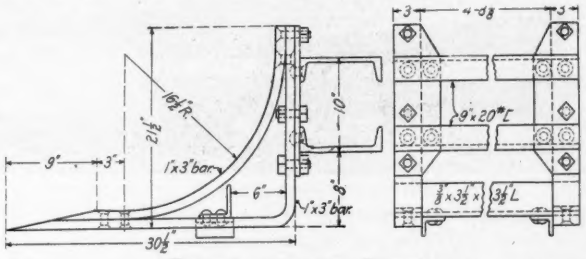
RAILWAY REGIMENTS ORGANIZED

THE United States War Department has given orders for the raising as rapidly as possible of nine regiments of railway engineers for service on the railroads in France. It is believed that these regiments will be placed in charge of sections of the railways in that country used for military purposes. These regiments are being organized under the direction of S. M. Felton, president of the Chicago Great Western and adviser to General Black, chief of engineers of the United States Army. The regiments will be composed exclusively of railroad men and each will be commanded by an engineering colonel of the regular army. Recruiting points for these regiments will be at New York, St. Louis, Chicago, Boston, Pittsburgh, Detroit, Atlanta, San Francisco and Philadelphia. There will be one motive power regiment, consisting of railway motive power officers and mechanics; five construction regiments, consisting of maintenance of way officers, track laborers, and bridge carpenters, and three operating regiments, to be composed of operating officers, enginemen, firemen, trainmen, etc. All the officers except the colonel and adjutant will be recruited from railway officers.

The regiments are being filled rapidly. Applications for over 50 per cent of the enlisted men for the New York and Chicago regiments were received in less than a week after the announcement was issued. Engineering and maintenance of way railway officers mentioned in the list of officers include T. W. Fatherson, engineer maintenance of way, Chicago Great Western at Des Moines, captain; G. W. Arn, assistant engineer, maintenance of way of the Illinois Central at Chicago, captain; C. M. Chumly, supervisor of bridges and buildings, Illinois Central at Memphis, second lieutenant; T. W. Brown, roadmaster of the Rock Island at Trenton, Mo., second lieutenant; W. J. Calvin, engineer maintenance of way, Chicago Great Western, St. Paul, first lieutenant; W. R. Roof, bridge engineer of the Chicago Great Western, second lieutenant.

A SHOE FOR A BALLAST CAR

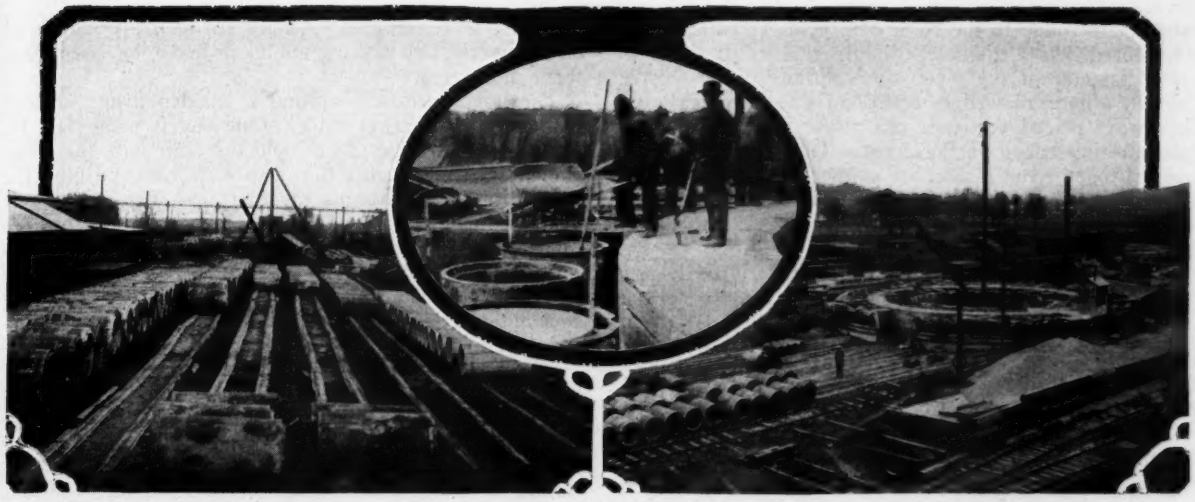
THE Pacific Electric has designed and is using shoes on which the wheels of a car run when distributing ballast, with excellent success. It is impractical to use ballast plows on this road as the lines radiate from Los Angeles and pass through numerous city streets, on which the transportation of such equipment is restricted by ordinances. These shoes have been designed to avoid the formation of flat spots on wheels which commonly follow the locking of the wheels, and the placing of barriers of ties ahead of them when shoving a car over the rail to spread the ballast without a plow. The ballast is unloaded from Hart convertible ballast cars, after which the shoes are placed on the rails and the wheels of a car run up onto the treadway. Three standard ties are then placed in front of the wheels, one riding on the



DETAILS OF THE SHOE

rails and the other two supported on arms extending out from the shoes. These ties form a barrier for the spreading of the ballast. The weight of the wheels holds the shoes onto the rails while the guides on the sides prevent them from slipping off laterally. These shoes are made of 1-in. steel and weigh about 85 lbs. per set.

These shoes have been found of special advantage on the divisions along the Pacific ocean, where a considerable mileage of line is constructed through beds of ocean sand which drift across the track during storms, burying them to such an extent that traffic is frequently interrupted. To restore service promptly the ballast shoes are employed in the same manner as when spreading ballast. It has been found that more can be accomplished in 5 hours with the use of these shoes and a work train than with 500 laborers with shovels in 10 hours.



Storage Yard *Pouring Concrete* *The Concreting Circle*

A Reinforced Concrete Pipe Plant

The Chicago, Milwaukee & St. Paul Has Developed Novel Facilities and Methods at Tomah, Wis.

THE Chicago, Milwaukee & St. Paul, which has been one of the leading roads in reinforced concrete design and construction, has been manufacturing reinforced concrete pipe for a number of years at its bridge and building material yard at Tomah, Wis. In its experience in this work it has developed special methods and facilities of an unusual character and, while the investment in a plant has been small, the pipe is being manufactured at a low unit cost.

In 1916 there were completed at this plant 3,492 ft. of 20-in. pipe, 3,754 ft. of 24-in. pipe, 2,352 ft. of 30-in. pipe, 2,754 ft. of 36-in. pipe, 1,464 ft. of 42-in. pipe and 3,162 ft. of 48-in. pipe, making a total of 16,978 lin. ft. of reinforced concrete pipe. In addition the force engaged in the manufacture of pipe also completed 111 reinforced concrete deck slabs for plate girder bridges, 16 16-ft. span concrete trestle slabs, 200 concrete stock troughs, several thousand sections of concrete platform curbing, right of way monuments, flue and manhole caps, concrete building sills, lintels, etc. A recent development, a concrete cattle guard, is shown in one of the photographs. In the manufacture of all this unit reinforced concrete work, quality receives as much attention as quantity and low cost, nearly all of the 17,000 ft. of reinforced concrete culvert pipe manufactured during 1916 having been shipped and not a single one was lost through improper manufacture, curing or carelessness in handling.

The concrete ballast deck slabs and the concrete trestle slabs enumerated above cover only those which it was found convenient to construct at this plant. Large numbers of these are built each year at the sites of the bridges in which they are to be used or in yards located more conveniently than the plant at Tomah. The concrete pipes also have been manufactured from time to time in temporary plants operated in connection with some of the larger construction projects. Plants of this kind were installed during the construction of the Lewison-Great Falls line in Montana and the double tracking of the Chicago and Council Bluffs division in Iowa. The pipe used on the eastern portion of the Puget Sound lines are now manufactured at Kinsey, Mont. During 1913, when large expenditures were being made for new construction and reconstruction, reinforced concrete pipes were cast at various points on the system to a total of 32,502 lin. ft. The corresponding total for 1916 is 25,446 lin. ft.

The Pipe

Plans were first made for the pipe in 1910 and no appreciable changes in design have been made since that time. Wooden forms were used at first, but metal forms were soon adopted, beginning with preliminary designs which were modified from time to time as their actual performance was studied. The pipes are circular in section and of plain cylindrical shape since the joint is made without a bell. The reinforcement is concentric, the three smaller sizes having a single ring and the three larger sizes two rings or cages of reinforcement. The table gives the principal dimensions and quantities of the several sizes.

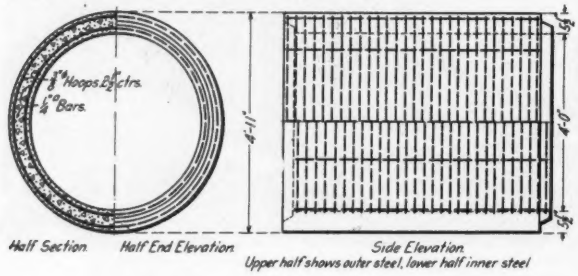
One drawing illustrates the latest design for the metal forms, which consist of four principal parts, including a cast iron ring for the top and the bottom and steel plate forms for the inside and outside cylindrical surfaces. The inside forms consist of a single unstiffened

Quantities of the Concrete Pipe

Size In.	Thickness In.	Weig't Lb.	Concrete Cu. Yd.	Cement Sacks	Stone Cu. Yd.	Sand Cu. Yd.	Bars, ⅜ in.	Lb. ¼ in.	Wire Lb.
20	.....	1950	0.47	3.3	0.40	0.21	.....	40	0.41
24	4½	2520	0.62	4.3	0.51	0.39	59	5	0.51
30	5½	3890	0.96	6.7	0.79	0.61	90	5	0.85
36	4½	3580	0.88	6.7	0.72	0.55	204	7	2.5
42	5½	4750	1.29	9.0	1.06	0.81	310	7	2.5
48	5½	5770	1.43	10.0	1.17	0.90	349	10	3.0

NOTE—Oiling of the forms requires one pint for the three smaller sizes and one quart for the three larger sizes per pipe.
All reinforcing bars are corrugated bars—⅜ in. bars are ⅜ in. in diameter and ¼ in. bars are ¼ in. in square

steel plate rolled to the form of a cylinder which, when unsecured, has a diameter slightly smaller than the inside diameter of the pipe. It is sprung out to correct size by a gang of wedges acting on a series of cast iron key ways placed vertically one above the other back of the meeting edges of the form. The wedges are connected together on a steel bar so that they can be manipulated readily from the top without need of entering the pipe. The outside cylinder form is made in two halves,



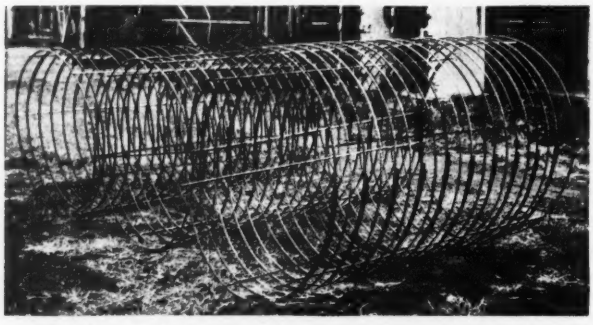
DETAILS OF 48-INCH PIPE

stiffened at the top by angle flanges and fastened edge to edge with hinges on one side and wedge locks on the other. In the earlier designs for these forms cast iron lever locks were used, but these broke frequently with rough handling and have been replaced by structural steel fittings which have proven much more durable.

Since the top ring form covers most of the opening into the annular space that is filled with concrete to form the pipe, the top ring cannot be placed in position until the form has been nearly filled with concrete. Until this is done the inside and outside forms are accurately spaced to insure a uniform thickness of the pipe on all sides by means of four short rods attached to the top of the inside form by a suitable bearing so that they can be turned out of the way when not in use Both the inside and outside forms are provided with rings attached to the sides to facilitate lifting them with a derrick. These forms have been built from time to time by different bridge shops, the railroad company furnishing the patterns for the cast iron fittings, top and bottom rings, etc.

REINFORCEMENT

One of the photographs shows the assembled reinforcements or cages made up from individual corrugated bars of ⅜ in. diameter and ¼ in. square size. This work is all done by hand, but the men engaged



REINFORCEMENT CAGES

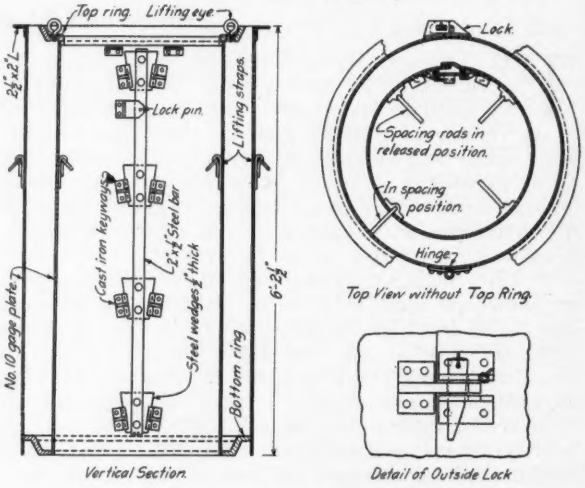
at it have become so skillful that the expense of assembling the reinforcement is small. The cages are made complete and set into the forms at a cost of approximately 0.3 cents per lb. of reinforcement. When the plant is running to capacity six men are employed on this work; two making the hoops and four assembling them into cages.

The hoops are bent around a wooden drum secured to the top of a heavy table. One end is made fast by a pin while a man walks around the table with the other end until he can secure that also with a second pin. He then wires the two ends together with two wires, one near each end of the lap. In assembling the rings they are hung on a horizontal beam which has notches in its upper edge to hold the rings to the correct spacing. The longitudinal rods are then fastened to the rings by wiring each intersection with No. 16 soft iron wire.

In the first years of the manufacture of concrete pipe at Tomah, the reinforcing rods were purchased in commercial stock lengths and then cut up into the required lengths at the plant. This proved a rather expensive process and, owing to the fact that a large number of rods of only a limited number of special lengths are required, it has been found more economical to order the rods from the mills cut to exact length and do away with practically all cutting on the ground.

THE PLANT

The manufacture of reinforced concrete culvert pipe was begun in a small way at Tomah with a plant of



DETAILS OF STEEL FORMS

primitive character that included no other mechanical facilities than a mixer. A locomotive crane in general service in the storage yard was used from time to time to remove and place forms and handle the finished pipe. The work was conducted in the open with no provision for protecting the pipe from the weather. Tentative plans for comprehensive plants were prepared from time to time which included a building to house the pipe while curing, with cranes, gantrys, trucks, etc., for the mechanical handling of the pipe and forms. All of these schemes, however, involved greater expenditures than were deemed justifiable. The layout finally adopted was the result of several years' study by those in charge of the making of the pipe with a view to securing the necessary mechanical facilities and protection from the weather with a minimum investment.

The plant consists of a circle 96 ft. in diameter containing two concentric annular trenches or passage ways formed by wooden walls having a height of a little more than 6 ft., which is the standard length for the sections of pipe. These passage ways, which are open at the top, are wide enough to accommodate one row of the larger

pipes and forms, or two rows of the smaller ones, while they are being filled with concrete. The inner trench is separated from the outer one by an annular space about 4 ft. wide, which is planked over from wall to wall to form a circular runway. The center of the circle is occupied by a guyed derrick with a 54-ft. mast and a 52-ft. boom with which it is possible to handle pipes and forms placed anywhere within the circle. For summer operation these pipe trenches are left open at the top, but in winter they are kept covered with tarpaulins, which are removed locally as desired to fill any one of the concrete forms, remove forms or lift out pipes. Coils of radiator pipes are installed along the walls of the

REINFORCED CONCRETE CATTLE GUARDS

circle so that steam heat can be supplied from a small boiler plant located near by.

The concrete mixer is located on one edge of the circle on a platform level with the runway previously mentioned. The mixer is a one-sack Smith mixer operated by an electric motor and equipped with an elevating charger, extending to the ground level. A material dock served by a track is located symmetrically to the rear of the mixer plant and a cement house a short distance to one side. The materials are wheeled from the material piles and dumped into the bucket of the elevator which rests in a slight depression in the ground when in the lowered position.

Storage for the completed pipe is afforded by a yard consisting of seven timber rollways, extending a distance of about 100 yards from one side of the concreting circle to a stiff leg loading derrick. This yard has been given a slight pitch or down grade toward the loading derrick, so that the pipes can be rolled with the minimum effort in that direction as the loading progresses.

THE OPERATION OF THE PLANT

The concrete for the pipes consists of one part cement, two parts of bank-run sand and four parts of crushed gravel which passes a 1-in. screen and is held on a ¼-in. screen. The plant is equipped with 4 sets of 20-in., 10 sets of 24-in., 5 sets of 30-in., 4 sets of 36-in., 3 sets of 42-in. and 6 sets of 48-in. forms. Each complete set consists of one inside form, one outside form, one top ring and three base rings. The extra base rings are required by the plan of operation, which is dependent on the fact that a pipe will set sufficiently in 24 hours under average temperatures to permit the removal of the top and side forms, but that it must set for a period of three days before it is strong enough to permit it to be lifted off the base ring with safety. As a consequence the side and top forms are used three times before the base ring used on the first day can be released for reuse. In accordance with this system the concreting circle was designed to afford space for three times as many pipes as can be concreted in a single day.

The concreting gang consists of 12 or 13 men distributed as follows:

Three men wheeling sand and stone
One man wheeling cement
One mixer operator
One elevator operator
Two men wheeling concrete
Two tampers
Two finishers

When the sand supplied is wet an additional man is required to scrape the elevating bucket, as it will not clear itself.

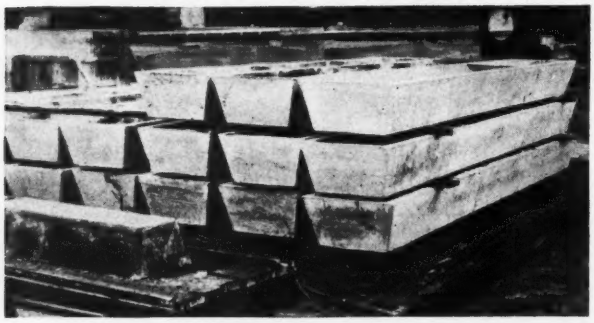
The operation of concreting a pipe commences with the removal of a pipe that has cured for the necessary three days so that the base ring may be released. Following this the side and top forms are removed from a pipe cast the day before and thoroughly oiled on all surfaces coming in contact with the concrete, a lighter oil being used in winter than in summer. The side forms are assembled on the base ring, but the top ring is left off and in its place a wooden cover cut to approximately the inside diameter of the pipe is placed on top of the inside form. The concrete coming from the mixer in wheelbarrows is dumped on this cover from which it is scraped into the form by shovels. Two forms are filled simultaneously with a tamper at work on each one, using as a tamping tool a piece of ¾-in. pipe long enough to reach the bottom of the pipe conveniently. These men also scrape the concrete off of the wooden cover as the wheelers deliver it. When the pipe has been filled to

THE MIXER AND THE CIRCLE

the level of the top joint, the two finishers place the top ring and fill the remaining space with a 1-2-2 concrete and float off the exposed surface.

After three days the green pipe is lifted out of the trenches by the derrick with the help of two rope slings which hold it in a vertical position. The rather delicate operation of tipping the pipe over on its side is accomplished as shown in one of the sketches with the help of a sloping bank of sand. The descending end of the pipe is brought to rest on two bags of sand so that the middle is free for the removal of the slings so that they can be rearranged to lift the pipe in a horizontal position to place it on the rollways.

The average run for the plant with a full force is 24 pipes of assorted sizes in 10 hours. A maximum run of 27 pipes has been secured. The pipes are loaded and blocked up on flat cars by an electrically-operated stiff-legged derrick, this work being commonly done by the

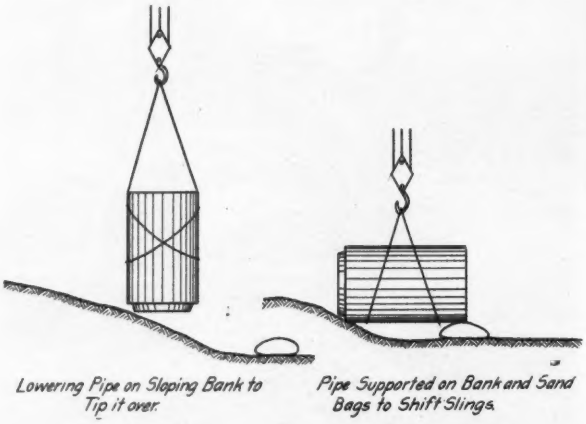


CONCRETE STOCK TROUGHS

regular loading crew of the bridge and building storage yard.

OTHER PRODUCTS

Besides the concrete pipe a considerable number of other miscellaneous members of unit-construction have been made each year at Tomah for use in bridge and building work. A unit platform curbing has been in use for a considerably longer period than the concrete pipe, while one of the most recent developments is the stock trough shown in one of the photographs. During periods of heavy construction or reconstruction work, concrete slabs for the decks of girder spans and



METHOD OF TIPPING PIPE

for reinforced concrete trestles and reinforced concrete piles of the pre-cast type have been built here on an extensive scale.

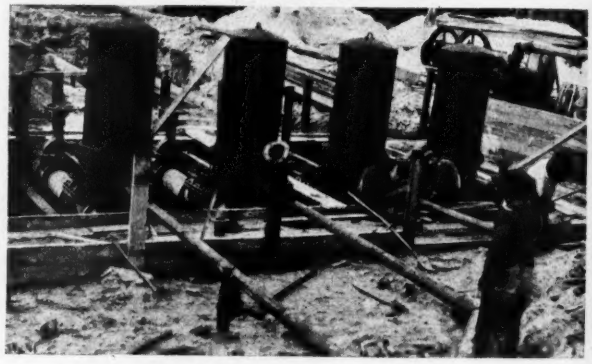
Owing to the fact that the plant for the concreting of the pipe is designed especially for that purpose, it is not suitable for the concreting of other forms and, as the latter are commonly built in small lots at irregular intervals, no special plants have been laid out, but instead a general utility plant was installed, which serves all the various forms with about equal facility. This consists of a chain belt mixer of one-sack capacity, located adjacent to a wooden platform of considerable area on which the forms for the various units are assembled. In general, the platform is used as the bottom form, with side and top forms that are removed a day or two after concreting, while the concrete member is left in place on the platform until strong enough to be removed for storage.

The manufacture of the various concrete units is carried on under the direction of George T. Richards, superintendent of bridge and building shops, and under the general supervision of C. F. Loweth, chief engineer, and L. D. Hadwen, engineer of masonry construction of the Chicago, Milwaukee & St. Paul.

HYDRAULIC RAMS AT A WATER STATION

THE Florida East Coast has recently installed four hydraulic rams at its locomotive water supply station at Fort Pierce, Fla., to secure an increased supply of water. The old station included a well, the capacity of which was such as to permit pumping for only 5 or 6 hours out of each 24, and the amount of water secured was insufficient to meet the requirements of the traffic. After considering other plans, it was decided to take advantage of an existing dam which developed a head sufficient for the operation of hydraulic rams to pump the water.

In this vicinity the railway closely parallels the Indian river. In reclaiming a large area of land lying inland from the railroad a system of small drainage canals has been built, these canals converging and emptying into a



INSTALLING THE RAMS

tributary of the Indian river which flows under the tracks. This stream has been enlarged into the main drainage canal of the reclamation project and a dam has been constructed across it at a point 1,000 ft. inland from the railroad. This dam developed an available head of 6 ft. 6 in.

In order to operate the ram a fore-bay 8 ft. wide by 30 ft. long was built of concrete adjoining the dam at the upper level into which the water was diverted by means of a wing or a deflector wall. From this fore-bay the water passes to four 12-in. rams located in a building built for this purpose about 90 ft. below the dam. The rams were placed at the elevation of the tail race with 12-in. drive pipes leading from the fore-bay. The discharge pipes from the four rams were connected to one 5-in. delivery pipe. The water is pumped to an elevated tank, the top of which is 45 ft. above the ram and 15,000 ft. distant from the pumping station, resulting in a friction head of 50 ft. in addition to the direct lift of 45 ft. Each of the rams uses 700 gal. of water per minute in its operation and delivers 60,000 gal. per day into the tank, making a total pumping capacity for the battery of 240,000 gal. per day.

Since their installation these rams have been subjected to severe tests. About twice each year this locality is

subject to freshets. As the rams were placed at the mean level of the tail race, the water in the race, which has raised 6 ft. 4 in. in times of flood, practically submerges the rams or comes within 2 in. of their normal head. Also because of the varying cross section of the canal above and below the dam the water rises a greater distance below the dam than above it where it is not confined. As a consequence, the available operating head is reduced during high water. In spite of this fact the automatic air feed of the rams enables them to operate under these conditions, although at times their operation has been slowed down to such an extent that it has become necessary to use the old steam plant as an auxiliary supply. This plant was installed by company forces, and the rams were supplied by the Rife Hydraulic Engine Manufacturing Company, New York.

Recent Specifications for Cross Ties

THE Pennsylvania Railroad has made a number of revisions in its specifications for cross and switch ties which are designed to overcome certain difficulties encountered by the tie inspectors in enforcing the preceding specifications and also to correct, as far as possible, the irregularity or inconsistency in the classification of ties that results from the loose use of names for the various species of timbers. This specification and that of the Lehigh Valley, recently issued, also incorporate the new grading rule for southern pine for the classification of yellow pine and cypress ties.

The confusion of local names for various trees has been dealt with quite successfully by the Pennsylvania Railroad and others in previous specifications by giving, in the specification, a list of all the different names by which each species of tree is known in the various localities. For instance, the specifications of the Pennsylvania and the Lehigh Valley contain the following note after the general name "hickory": "Bitternut or swamp hickory, mockernut, white or whiteheart hickory, shellbark or big shellbark hickory, shagbark or scalybark hickory, pignut, red or brown hickory."

A more formidable difficulty arises from the fact that general class names popularly used include woods of materially differing properties. These specifications in common with a great many others divide ties into two general classes to differentiate between those which can be placed in service without preservative treatment and those which require treatment. Thus the old specification of the Pennsylvania provided for Class A ties, for use without preservative treatment, which included white oak, black locust, black walnut, black cherry, chestnut, sassafras, red mulberry, long-leaf pines and bald cypress; and Class B, for use only after preservative treatment, which included red oak, beech, hickory, honey locust, hard maple, soft maple, hackberry, sycamore, red gum, black gum, ash, birch, butternut, elm, short-leaf pines and long-leaf pines.

It has been found by experience that the common class names do not always separate the wood properly into these two groups. For instance, the Pennsylvania Railroad has found that a great many ties commonly classed as white oak have not been giving the life that was formerly obtained from this general class as untreated ties. This is notably the case with the chestnut or rock oak ties which are popularly classed as white oak.

The new specification has overcome this difficulty by discarding the class name "white oak" entirely. Instead the term "resistive oaks" is used to designate those which shall be used without treatment, and "receptive oaks" for those that must be treated. The former includes white oak, post oak, burr or mossycup oak, overcup or swamp post oak, chinquapin oak, swamp white oak, cow or basket oak and live oak. "Receptive oaks" include chestnut or rock oak, red oak, scarlet oak, flax, yellow or quercitron oak, turkey oak, Spanish oak, pin oak, water or spotted oak, laurel oak, shingle oak, willow, swamp or peach oak, Alabama, bastard, Durand, Mobile or swamp oak.

Occasion was taken in connection with this change in the specification to make a similar change as to the yellow pines by incorporating the principle of the new density rule of the Southern Pine Association. There is the difference, however, that the term "compact" replaces "dense," and "coarse" is used in place of "sound." Under the application of this idea, Class U ties (which may be used without treatment) include cypress ties and pine ties which "must be of compact wood, with not less than one-third summerwood when averaging five or more rings per inch, or with not less than one-half summerwood in fewer rings, along any radius from the pith. Ties of coarse wood, with less than five rings per inch and less than one-half summerwood, or with less than one-third summerwood in five or more rings per inch, will be rejected." Class U has the further restriction, applicable to all species of wood, in that it includes only ties with sapwood not more than three inches wide at either plate-bearing area on the top of the tie.

The Lehigh Valley has also adopted the principle of the density rule in a new specification for yellow pine ties. In case of yellow pine heart cross-ties the density rule is used exactly as adopted by the Southern Pine Manufacturers' Association, with the following additions: "To be all heartwood, with the exception that 1½ in. of sound sapwood will be allowed on the corners if measured diagonally across the end. They must be free from injurious ring shakes or through shakes that extend to the surface; unsound knots, or knots in groups that impair the value for best quality ties."

For its new specifications for yellow pine cross-ties for use with a preservative treatment a modification of this density rule is used which is as follows: "Ties must be well made out of sound timber, viz., cut straight with ends squared, one tie from a tree section, free from dote, shakes, excessive checks, and large knots or cluster knots which come under tie plates. Either end must show at least 5 dark annular rings to the inch, measured in the two-inch space midway between the center and corner, one-third of this area to be of dark wood, and the contrast between the dark and the light wood must be at least medium. Ties with 3 or 4 rings per inch will be accepted if the dark wood and light wood are equal.

The Pennsylvania has also found it desirable to make certain changes in the method of specifying dimensions, which it is believed will simplify the work of the inspector. Tapered ties, or those with excessive wane, have always been a source of considerable trouble, but this is overcome by requiring that "All ties must have beneath the whole of both plate-bearing areas on each tie the thickness specified," and "All ties must have throughout the length of each plate-bearing area on the top of each tie the widths specified." The table of dimensions

given for the various grades is also amplified by the statement that "The above requirements are minimum measurements. Ties less than six inches thick or six inches wide will be rejected." However, it is not only the ties that are two small that cause trouble, but the inspector is frequently embarrassed by the tie producer, who cannot understand why he should not accept as a tie, a great log which has been hewn on one side sufficient to provide the necessary plate-bearing areas. This contingency is provided for conclusively in the new specifications as "Ties more than 8 in. thick or 12 in. wide will be rejected or degraded." The Lehigh Valley specifications exclude ties that are more than one inch over the specified thickness.

Another addition to the Pennsylvania specification covers the prevailing idea that it is better to place a tie with the narrower of two sides up, or in other words, with the annular rings concave downward rather than concave upward, by the following clause: "The top of a tie is the plane farthest from the pith of the tree (whether or not the pith is present in the tie), or the narrower of its broader long planes when the pith is half-way between them." Provision is also made that ties which have been stood on their ends upon the ground will be rejected.

NEW METHOD OF REROLLING RAILS

A NEW process for rerolling rails has recently been developed and put into use whereby the difficulties of rerolling are materially reduced and badly worn rails are rerolled more successfully than has heretofore been possible. The process is also said to improve the quality and finish over that which it has been possible to secure in the re-finished rails previously.

The need for this new process comes about through the fact that practically all of the wear on a rail is in the head and that in the endeavor to reroll it to its original symmetrical form and contour the work is not evenly distributed, thereby tending to cause distortion of the rail section and internal strains in the metal itself. The rolling on some portions of the section is heavier than on others, making it difficult to fill the rolls completely in all parts, particularly the upper corners of the head. The new process is founded on the idea that it is not only permissible but desirable that the contours of rerolled rails shall differ materially from those of new rails if the modified sections will result in a better quality of product. In particular it has been found desirable to resort to rail sections having materially narrower treads with greater slopes on the sides of the head and even to produce rail sections with an unsymmetrical head. These forms correspond to the worn rail heads from which they are rerolled and thus the work of the rolls is uniformly applied. Little change is made in the web and base. The heights of the web and fishing angles are maintained, thus permitting the use of the same splices that were employed on the original section.

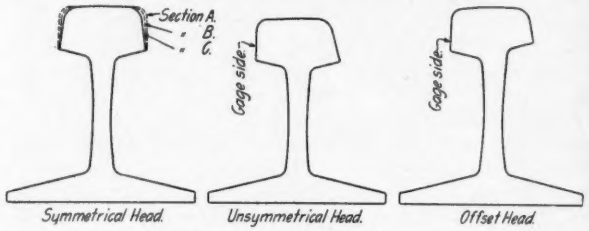
In general the process provides for a compensation for the loss of section in badly worn heads by the use of the narrower treads without making a material reduction in the width of the lower part of the head or of the upper fishing surfaces. The two sides of the head are given a sufficient pitch to connect the lower part with the narrow tread. To carry this process to a practical conclusion it is necessary to divide the worn rails into several grades depending upon the extent to which the original section has been worn or reduced. Each grade is then given a new contour consistent with the amount of material available in the old section. When rerolled, a standard A. S. C. E. 100-lb. rail is reduced to about 92 lb., preserving the original length, or to a 90-lb. rail 1 ft. longer than the original, *i. e.*, a 33-ft. rail becomes 34 ft. long after rerolling. Lengthening rails in this manner is proving of interest to the railroads.

A modification of this plan utilizes the narrow treads with the base of the head substantially of the full width, but instead of sloping both sides of the head, one side is given a contour like that of the original rail and all the adjustment is made by increasing the slope on the other side of the head. Rails rerolled to this section are laid with the sloping side of the head on the outside of the track and in consequence they can be relaid in track with rails of the original section. Rails of this type are especially adapted for use on the inside of curves where they are said to reduce the wear and friction.

A third modification of this process has been devised in which the rail head is reformed to give it a tread and sides substantially as in the original section, but the lack of metal in the head is compensated for by reducing the depth of the head on the worn side, that is, the upper fishing surface is pushed further away from the lower one. This requires the use of a deeper and, therefore, stiffer splice bar on the one side and has the effect also of increasing the section modulus of the rail.

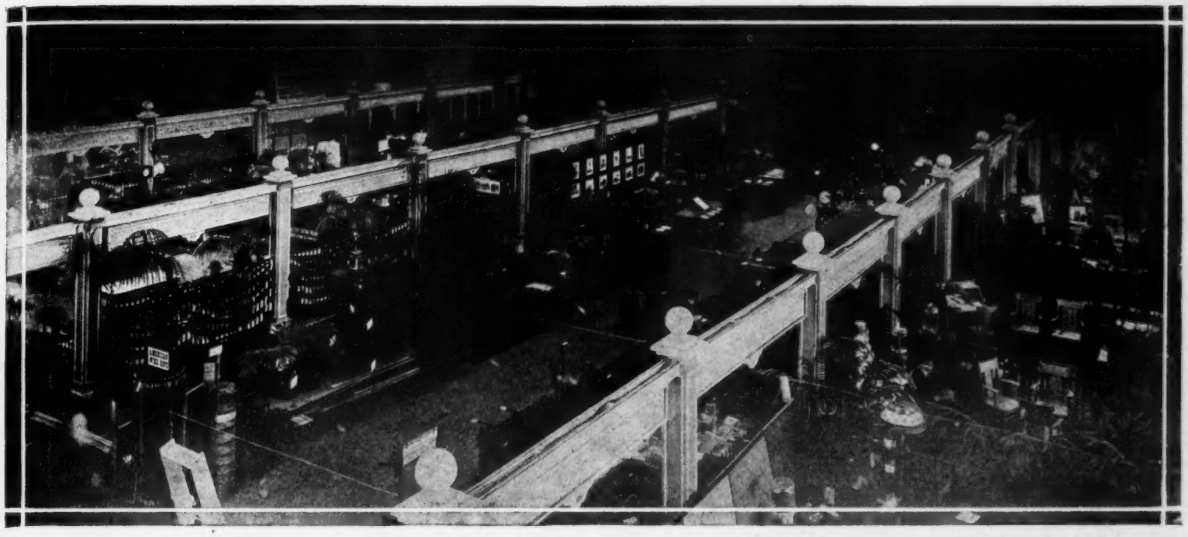
The new process is said to have decided advantages from a metallurgical standpoint. The shape of the rail head insures proper work upon it in the rolls. Its reduced percentage of the total area of the section permits a more uniform cooling of the head and flange, thus minimizing the danger of internal strains and failure.

In the practical application of the new process the worn rails are sorted into various grades according to the contour and the amount of metal in the head. For each of these grades a set of rolls is prepared to make a finished section with the head conforming in general to the shape of the worn rail head. After grinding off slivers and chips resulting from side flow and the mashing of the metal in the head in track, the rails are heated to a moderate temperature and run through the rolls specially prepared for them. The work done by the rolls reshapes the section and elongates the rail sufficiently to saw off the battered ends and old bolt holes, leaving the rail its original length or longer if desired. The rerolled rail is then cooled, straightened and drilled in the usual way. The process is continued for the various grades, each employing its special set of rolls and being finished and shipped in a lot by itself. The first grade or rails with heads showing the least wear are in all cases rerolled to a section with a symmetrical head, but the new process is of particular advantage for rerolling the more badly worn rails. The Michigan Central is now having 100-lb. rails rerolled to 90 lb., with unsymmetrical heads; the Chicago & North Western has used the unsymmetrical head, likewise the St. Louis-San Francisco and the Chicago, Milwaukee & St. Paul is using a rerolled rail with symmetrical head.



TYPICAL SECTIONS PRODUCED

Patents covering these processes have been granted to George Langford, general superintendent of the American McKenna Process Company, with mills at Joliet, Ill., Kansas City, Kan., and Warners, N. J.



NATIONAL RAILWAY APPLIANCES EXHIBIT

Papers Received in a Contest Describe Interesting Features and Offer Suggestions for Improvements

AS announced previously in these columns the *Railway Maintenance Engineer* joined with the Railway Age Gazette and the Railway Signal Engineer in a contest on the Ninth Annual Exhibit of the National Railway Appliances Association, held in the Coliseum at Chicago on March 19 to 22, inclusive. Some of the papers entered in the contest concerned railway maintenance materials and devices primarily. The rest were entered in a contest on the exhibit as a whole or one on the signal devices. Those entered in the maintenance contest were submitted to A. S. Baldwin, chief engineer of the Illinois Central; C. F. W. Felt, chief engineer of the Atchison, Topeka & Santa Fe, and W. H. Penfield, assistant to the vice-president, Chicago, Milwaukee & St. Paul, who awarded the first prize to F. L. Elstrom, assistant engineer Chicago, Milwaukee & St. Paul, Chicago, Ill., and the second prize to C. W. Baldridge, assistant engineer Atchison, Topeka & Santa Fe, Chicago, Ill.

The two prize-winning papers appear below, followed by other contributions by F. R. Truesdell, assistant engineer, Michigan Central, Jackson, Mich.; Albert Woerner, assistant division engineer, Baltimore & Ohio at Connellsville, Pa., and A. M. Clough, supervisor, New York Central at Batavia, N. Y. A paper by E. M. Grime, supervisor of bridges and buildings, Northern Pacific, Dilworth, Minn., which won the general prize in the contest on the exhibit as a whole is also included.

FIRST PRIZE

EMPHASIZE NEW DEVELOPMENTS

By F. L. Elstrom,

Assistant Engineer, Chicago, Milwaukee & St. Paul, Chicago, Ill.

The 1917 exhibition of the National Railway Appliances Association, held at the Coliseum and Annex in Chicago, Ill., from March 19 to 22, inclusive, was entertaining, instructive, artistically produced and well worth the attendance of all railway maintenance men. The track maintenance man seemed to be favored in the number of exhibits for his benefit. Practically every material and appliance for the maintenance of track was shown in its most modern form. Several recent designs of tie plates, numerous rail joints, frogs and crossings and a frictionless rail were exhibited. Novel and ingenious designs of anti-rail creepers and nutlocks were demonstrated and the latest developments in switch stands, derails, fencing and fence posts were displayed. The special features of each appliance were ably presented by the representatives and, as a rule, were based on the elimination of objectionable features in the old designs. The economy of using treated ties and timber was practically demonstrated by an interesting exhibit.

Numerous types of motor cars were on display, from the official inspection car, with its automobile engine, to the hand car, with its detachable one cylinder. Each design had special features recommending it for some particular branch of the railway maintenance service. An unusually large number of cars with kerosene engines were exhibited, indicating an increase in the use of that product for fuel.

Track tools, machinery and working accessories were shown in improved designs. A few of the devices deserving special mention include a reversible rail-bender, a special tool grinder for track maintenance men and a track drill with an easily adjustable rail hook for drilling through splice bars, guard rails, frogs and crossings where the variable thickness prevents the use of the ordinary track drill. Lights for night work designed with a special view to portability were exhibited, and considerable interest was shown in an ice and snow thawing outfit operating on the principle of an ordinary blow torch. Special track machinery was demonstrated, either by a model or a full-size machine. A rail loader, a ballast spreader, the pneumatic tie tamping machine and a track layer were a few of the labor-saving devices which the track maintenance man was given an opportunity to become acquainted with.

The construction and maintenance of bridges, buildings, water supply plants and coaling stations are important items in the operation of a railway, and many

exhibits were presented for the benefit of the water service and bridge and building men. There were numerous exhibits advertising certain brands of the materials and accessories in common use in these classes of service. These included paints, roofing, glass constructions, waterproofing, paving blocks, fire extinguishers, door locks and tackle blocks.

Recent developments in the use of concrete were demonstrated by a number of exhibits. A concrete smoke jack was exhibited by one firm and a new machine for molding concrete fence posts was shown by another. Concrete placed by the cement gun has found many new uses, especially as a protective measure for miscellaneous wood and steel structures such as smokestacks, flues, roofs, bins and coal hoppers. Coaling stations of several designs were demonstrated and a model of a balanced, automatic elevating outfit was in operation at one of the booths. Pumps, air compressors and pneumatic tools had extensive exhibits, and a large-size dial recording scale attracted considerable attention.

The water service branch was well represented and the exhibits of water columns, valves, windmills, tanks and towers of steel and wood were all of interest. One of the articles on display was a redwood water tank. An extensive investigation had proven that this material is economical as to original cost under present conditions and also produces a durable structure.

The entire exhibition was undoubtedly of interest to the railway engineer, as no one realizes the importance of a broad knowledge of railway appliances more than such a man, even though this information is not required in his daily work. There were, however, certain exhibits presented largely for his benefit, such as engineering instruments and surveying and drafting room accessories. The manufacturers of these articles ably demonstrated that they were keeping pace with progress by making improvements and changes in their products to enable the engineer to perform his work with greater efficiency and accuracy. A study of the exhibits in general indicated that while many developments are being made in railway appliances along the lines of efficiency and economy, a surprising number of changes and additions have been made to conform to the demand for increased safety.

The representatives of the exhibitors are to be especially commended for their unfailing courtesy and readiness to explain their products and answer questions regarding their operation for those interested. Their attitude toward frank and open criticism indicated that they were fully aware that suggestions for improvements were most valuable when they came from the men using their products. The practical value of the exhibition lies in the fact that it affords an exceptional opportunity for keeping up to date and well informed regarding railway appliances, and it is so recognized by the railways. However, a certain amount of brain work and investigation on the part of the visitor is necessary to perceive the developments in the appliances from one year to another, and unless these are made more readily discernible, many may complain that "the exhibitions are the same every year." As a suggestion for a partial remedy of this state of affairs it is proposed that each exhibitor post in a conspicuous place a large-size placard calling attention to developments in his products within the past year or two years. If no recent developments have been made, the exhibitor could post the unusual feature distinguishing his product from all others. This would make it easier for the average visitor to inform himself regarding the progress in railway appliances from year to year and to derive the greatest benefit from the exhibits.

SECOND PRIZE

MANY DEVICES ARE SHOWN

By C. W. BALDRIDGE,
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago, Ill.

The National Railway Appliances Association is entitled to congratulations for the successful and interesting exhibition which it presented in the Coliseum and Annex at Chicago from March 19 to 22, 1917. The show included 138 separate exhibits, in many of which two or more companies shared the space on account of lack of sufficient room for all who desired to place their products upon display.

A canvass of the show developed the fact that 12 different exhibitors showed some form of crossing signs, 7 of them showing wig-wag, swinging pendulum type signals. These signs are, in most cases, operated by track circuits, which are closed by the movement of a train onto the track within the limits fixed by the bonding of the rails for that purpose. The closing of the track circuit releases the operating mechanism of the signal, resulting in the display of a red light in the center of the pendulum and the swinging of it back and forth to the accompaniment of the ringing of a crossing bell, the operation continuing until the train passes out of the bonded section of track. One type of crossing signal was so constructed that when a train entered the block, a board was displayed bearing the word, "Stop," and when the block was cleared, the stop sign was lifted from sight.

Eleven exhibitors had one or more types of crossing bells on display. In most cases a gong type of bell was shown, but a number made use of the engine-bell type mounted on the top of a post. Other designs of crossing signs were shown, some of which used various systems of lights to indicate the approach of a train.

The large display of audible and moving crossing signals drew attention to the need of the systematic collection of data showing the percentage of the failures of such devices to indicate the approach of trains correctly. It is obvious that a false clear signal at a crossing is much more dangerous than no signal whatever, and as such signals are being demanded more and more by legislative enactment, information should be collected to show whether such devices are an added safeguard or an added danger to the public.

Only one exhibitor was on hand with a display of switch and signal lamps and accessories, but the display was both thorough and pleasing in appearance. It also contained samples of the latest patterns of lamps and lanterns for switching and signaling use.

Insulated joints were displayed by four exhibitors, and fiber plates for insulating angle bar joints were shown by one additional exhibitor. All of the insulated joints shown, with one exception, were of the all-metal type.

Seven exhibitors had displays of rail joints, one of the newer ones consisting of a rail chair with an upward-projecting angle to provide means of bolting it to the rails. Another, also with a single tie support, provides two points of contact between the joint and the base of the rail, and but one point of contact at the head of the rail. The idea results in the abandonment of the beam value of the rail and derives its efficiency from a support of the head of the rail. The other joints on display were of well-known models.

Eight exhibitors were displaying rail anchors. In this connection it was interesting to note that only one so-called "combined anchor tie plate" was on exhibition. Of the seven makes of (straight) rail anchors displayed,

only one had not been exhibited at previous appliance shows.

Four exhibitors had displays of derailers, but none of them differed much from well-known patterns. One, however, was being shown that is so built that the hinge line can be raised or lowered to make it fit any weight and height of rail.

Eight exhibitors had guard rail clamps on display, these again showing marked similarity. The prevailing type is the usual heavy "C" iron passing underneath the track rail and guard rail and holding the guard rail to the proper width of flange way by means of wedges fitting between the ends of the "C" irons and the rails.

Three exhibitors had manganese-centered frogs on display, all of much the same type. All followed the same plan of showing the portion of manganese steel polished and the carbon steel rail parts in the natural color.

Eight exhibitors displayed switch stands, most of them of the ground-throw type, but two or three also showed high stands. The most frequent variation from standard patterns of switch stands consisted in an extra locking device to hold the switch points in their correct positions in case the switch stand should be broken down. One ground-throw switch stand was so designed as to produce the throwing movement by the use of a cylinder and spiral groove engaging a lug, thus doing away with the gears.

Nine exhibitors had displays of motor cars of various types and for various uses, ranging from a one-man work car to a small passenger coach or party inspection car. An interesting feature of the exhibit of motor cars was the display by every maker of section motor cars except one, of self-contained power units consisting of an engine mounted in a frame ready to be bolted onto a hand car body to transform it into a motor car. It shows the increasing popularity of this type of equipment. Two new concerns were among the exhibitors of motors cars, one with a very light steel-frame section motor car, the other with a "Party" inspection car designed for the use of officers making inspection trips of such speed to permit movement under train orders. Several of the exhibitors of motor cars, who have been in the business for several years, have brought out improvements during the year, but no very radical changes have been made.

Two exhibitors were displaying work lights, consisting of devices for supplying powerful lights for use around wrecking outfits, steam shovels, and other places where powerful lights are needed temporarily. The carbide lights have made a great improvement in this class of railway equipment, as by their use the materials necessary to produce a brilliant light occupy but little space and require very little preparation, and not much mechanism for their use.

One exhibit of considerable interest and of undoubted importance was the pneumatic tie tamping machine. In view of the increasing scarcity of labor, it is important that as much work as possible be done by labor-saving machinery, and the pneumatic tie tamper should prove a great help in track maintenance. The manufacturers of this device have introduced several improvements during the past year, as might be expected in any new machine of this importance, and the day when this device was an experiment appears to be safely past.

Another device which is comparatively new, the snow torch, for melting ice and snow around switches and interlocking plants, was being shown by two exhibitors. It is a larger size of gasoline blow torch built on the principle of blow torches used by firemen, plumbers, etc., but differing somewhat in details.

A number of interesting devices used in water service were on exhibition, the most important, perhaps, being the penstocks and their valves, oil-burning pumping engines, and air lift pumps. Another class of exhibits of interest had to do wtih enginehouse and coaling station equipment. There were also several interesting devices on display which should be classed as freight house and station equipment, among the most important of which are dial scales, motor trucks, telephone equipment and fire extinguishers.

A few exhibits were also shown of devices applicable to bridges and culverts, and many others which could only be listed as miscellaneous, but of so varied a character as to make the Railway Appliances Show a display that would interest any railway employee, no matter what his line of work. It is the writer's opinion that the Railway Appliances Show holds so much of educational value to every railway employee that every one in railway service who can possibly do so should attend it, and study it carefully not only once, but as regularly as circumstances will permit. Railway officers will undoubtedly find that their men who attend the American Railway Engineering Association convention and the Railway Appliances Exhibit have acquired more knowledge of value in their work, at less cost to the company. than can be acquired in any other way.

MANY SAFETY APPLIANCES

BY E. M. GRIME,

Supervisor of Bridges and Buildings, Northern Pacific, Dilworth, Minn.

One of the first impressions received at the Ninth Annual Exhibit of the National Railway Appliances Association was that of the large number of safety devices exhibited for the maintenance of way, as well as the signal, department. Among such devices the following may be mentioned.

Several makes of motor inspection cars of comparatively light weight were shown, some of all steel construction, with the deck placed practically in the plane of the axles, making it less than 12 in. above the rail and very convenient for getting on or off, and also reducing the liability of derailment. Another device under this head was a lightweight portable derailing frog to which a metal blue flag is attached. This can be carried about readily and placed as required for the protection of men working on cars on a repair track or for the protection of outfit cars when set out on a side track. A set of derailing frogs very similar to the design in common use were shown, except that by means of a clamp engaging the frog, passing under the rail and held to the rail by a wedge plate, the frog is held against slipping or turning and no spiking is necessary. Another was a combination switch stand target and switch lamp where the target consists of a circular disk surrounding each of the lenses. Without in any way detracting from the visibility of the target night or day, this reduces the total height of the switch stand by about 12 in. There was also a switch-locking machine which can be applied to both switches of a cross-over and by which one operation of the lever will unlock, throw and relock both switches, insuring the safe handling of a cross-over movement, especially when the device is connected up with signal indicators.

The exhibit of motor cars was most extensive. Practically every type was represented. A car of special interest was an all-steel frame, double chain, friction disk reversible drive, kerosene-burning car, large enough to carry a crew of 10 or 12 men and tools, or a pile of bridge timber. There were also exhibited two typical

designs of electrically-operated rubber-tired freight house or baggage platform trucks.

The various models of low type switch stands were as usual very attractive to track men. One company exhibited a high tower target to be used with the ordinary low type stand. Another model of interest was the low type latch stand wherein the switch can be run through without damage to the stand. An innovation shown in switch targets is an enameled two-piece target, each piece bent at a right angle in the center, interlocked together and slid down from the top of the spindle, after which the lamp tip is bolted or riveted in place.

The standard makes of rail joints were well represented, and in addition a recent design of joint, which consists of but two parts, wedge-locked together and combining the functions, of rail chair, rail brace, tie plate and anti-creeper without the use of bolts, but simply held in place by spikes. Further illustrating the reconstruction period in the matter of track fastenings is the variety of anti-creepers shown.

Two new tools which appeal to track men are a clamp to fit over the main rail with a simple lever arrangement by which a switch point can be straightened; also a simple wedge arrangement which can be caught under the base of a rail, providing a secure fulcrum against which a bar can be placed when respacing ties. Other labor-saving devices for track men on exhibit as usual were the rail laying machine operated by three men and the pneumatic tie tamper and drilling machine. Bridge men were particularly interested in a pole or pile-pulling jack of 15 tons capacity, which can be conveniently operated at any angle when suitable footing is obtainable. Another device interesting to maintenance men is a flexible roller bearing which can be applied to hand car or motor car bearings.

Of special interest to water service men were the full-size models of water columns. Four manufacturers were represented in this line, and it was noticed that each has now adopted the telescopic type of long-range drop spout. Sectional working models of the valves showed such important features as rapid drainage to preclude freezing, easy operation, large and quick opening and balancing by water pressure to prevent water hammer in the pipe lines.

Bridge and building and signal men were interested in a new electrically-operated type of crossing gate. Each operating gate head contains a small electric motor to control the operation and one operator can thus handle with ease gates at several street crossings at a distance from the tower house.

In the line of concrete should be mentioned several exhibits of the work done with the cement gun, a portable steel form for the erection of concrete water tanks and a concrete fence post machine. A full-size reinforced concrete smoke jack weighing only 5,000 lb. attracted much interest.

Several manufacturers showed some designs of both portable and dormant freight house scales of the dial pattern, and it seems that this type will soon come into universal use as being much more accurate and quicker in operation than the plain beam pattern.

In the construction line should be mentioned the large-sized model of a building showing an improved method of glass construction for partitions, sky lights, cellar covers, train sheds, etc.; also the various types of asphalt roof covering, waterproofing compounds and asbestos products of all kinds. A full-size section model was shown of a permanent method of laying underground steam mains in insulated reinforced concrete conduits, providing for expansion by the usual methods, and in addition roller bearings at intervals so the pipe can move freely or be turned, or even replaced without disturbing the conduit. Creosoted wood block floors were shown by several manufacturers.

Manufacturers of engineering instruments and office supplies exhibited a complete line. Draftsmen were interested in a new type of lettering pen, which has an ink reservoir similar to a fountain pen and which should be a time saver, and surveyors were shown an improved type of transit having a stadia circle and U-shaped standards. One of the latest designs in nut locks was represented by a roller locking nut.

On the whole this exposition was most satisfactory and was attended by a greater number of visitors than ever before. While the general arrangement was good, it would make some improvement and help the man who has but a very limited time to spend at the show if all the exhibits of a certain class could be grouped in the same location for ready examination and comparison. It is also suggested that many manufacturers could add to the value of their displays by exhibiting types of equipment or material removed from actual service, together with complete records of the performance secured from them.

SHOULD GROUP EXHIBITS

By F. R. TRUESDELL,
Assistant Engineer, Michigan Central, Jackson, Mich.

It is an impressive fact that more and more of the men in the ranks are visiting the show each year, in addition to those who are in Chicago to attend the conventions of the Railway Signal Association and the American Railway Engineering Association. This being the fact, the part of the field of the appliance show, which is now filled by descriptive literature, might be filled to better advantage by special instructions in the uses of exhibited articles. Many of the men who are going to use them do not have much use for technical literature in their work, but hardly any one of them would pass by a power track tamper in use on a piece of ballasted track without finding out everything there was to know about it.

A systematic arrangement of the exhibits would be a help to one looking for special devices of any kind, but who has not the time to go through the whole appliance show to find them. For instance, all motor and hand cars might be put on one aisle, frogs, crossings, derails and special work on another, etc. If there were some exhibits which could not be classified in this way one aisle could be used for miscellaneous exhibits. An arrangement of this kind seems most desirable from the point of view of the visitor, on account of the increasing size of the show.

The exhibits of section and special motor cars were very good. All that were there last year were there again this year, with some new ones, including one with a novel friction drive. In another exhibit was a car fitted with iron pipe hand-rails at about the height of a man's waist from the bed of the car, across the front and rear and down the center, with expanded metal guards at the front and rear. This is a good move for safeguarding motor car travel. Another point of note in the motor car exhibits was the number of detachable engine units which have been brought out for use lately. They vary from two to six horse-power and offer a simple and cheap way of converting hand cars into modern motor cars for section crews.

There was an increase in the number of anti-creeping devices, most of which still depend on wedging action for their grip on the rail. One anchor, of one piece, is

bent from a square steel bar which wedges over the base of the rail by driving sideways with a spike maul.

A large number of automatic registering scales of all sizes was exhibited at the show. The effort in this line seems to be to get away from the intricate mechanisms depending on parts easily broken in the hard use which such machines receive. One scale makes a point of the fact that no springs are necessary in its make-up.

Interesting in the extreme were the exhibits of timber, both tie and structural, shown by several of the lumbermen's associations. Ties properly treated and protected from wear show a phenomenal life under the hardest conditions. Cypress, which is highly decay resisting, was shown in another exhibit.

Quite a few special tools were shown which were of interest. A clamp for straightening bent switch points seemed practical and simple. This same exhibit showed a type of steel fence post, the cost of which compares favorably with any other type of post and has the advantage of great life. An interesting kink is the manner in which ordinary staples are used through slots in the post and bent at the back with a hand tool to make a very satisfactory fastening for the wire.

EXHIBITS CLASSIFIED

By Albert Woerner,
Assistant Division Engineer, Baltimore & Ohio, Connellsville, Pa.

The exhibits can be divided three classes: Those that "fill the bill" in all respects; those that "partly fill the bill," and those that "fill the space." In the first class I would include exhibits in charge of competent men who can explain their products in detail and which have, when practical, some method of demonstrating their products. It is true the expense of operating some devices would be costly, yet if one sees the appliance in operation it is more convincing. To illustrate—if a concern is selling tool grinders it is more instructive and convincing to the visitor if he actually sees the grinder in operation with its various fittings than it would be if the machine just lay there and the representative handed out pamphlets stating that they told all about the grinder.

Under the second classification I would include those exhibits that usually have high polished models or full-sized specimens of their products on tables and a man in the booth who offers various kinds of literature regarding the merits of his products; when at a slight cost he could have some device which would more clearly demonstrate the points he is trying to explain. I would also include in this class those manufacturers who place the booth in charge of a salesman rather than an expert.

To illustrate the first of this class, take the rail anchor in general. The prime requisite of an anti-creeper is gripping strength. This being the case, would it not be more convincing to the visitor if each manufacturer had some simple device for demonstrating and measuring the pressure that the creeper could withstand? To illustrate the second of this class I would recall an incident at one of the many motor car exhibits I visited. A section foreman was looking inquiringly at a certain car. The representative of the company asked if he was interested in cars and, when answered in the affirmative, gave the foreman a pamphlet which he said would explain all about the car. The foreman being rather disappointed said: "Yes, I received one of those last week with my car, but what I want to know is how to make it run."

Under the third classification I would place large concerns who occupy several booths and have very little to show. If we limit their display other exhibitors could be admitted. In reading the technical magazines we find among the advertisements many appliances that are of interest to every railroad engineer, but are never on exhibit at Chicago. Such things as portable bunk houses, ballast screens, concrete machinery and plants are things of interest to every railroad engineer.

AN APPRECIATION

By A. M. Clough,
Supervisor, New York Central, Batavia, N. Y.

It has been my privilege to attend each of the nine exhibitions that have been presented in the Coliseum and Armory at Chicago by the National Railway Appliances Association, and I can say without any hesitation that I have returned from all of them a wiser and better railroad man; wiser, because at each recurring exhibition there is something new or something old greatly improved which we need daily in our work; better, by coming in contact and exchanging ideas not only with the exhibitors, but with the railroad men whom it brings together. It is my impression that the exhibition would fall far short of what it now accomplishes were it not for this last feature. Men who are using a certain device tell others of its virtues and suggest a visit to the booth where it is exhibited. I could mention scores of instances where I have done this and where the same has been done for me.

One way to see the exhibit and profit thereby is to study carefully the list of exhibitors that appears in the technical journals before going to the Coliseum and also the diagram of the floor of the exhibit hall and carefully note the number of the booth or exhibit which contains some article or device which you are interested in, which has been recommended to you or which has appealed to you through the same or other sources. If your time is limited, look these up first and then use whatever time you have afterward to make a careful and thorough examination of all. Whenever your examination is not as complete as you wish, take the small, descriptive pamphlets home with you and study them over at your leisure. Show them to your subordinates, or leave your name and address with the person in charge of the exhibit and he will send them to you.

The one very important duty of the visitor is to show his appreciation of the tremendous effort that is made by the manufacturers of railway appliances to place before him the very latest and best devices known. Millions of dollars have been spent in years gone by in the manufacture and purchase of articles and devices that proved in a few years to be too light, badly proportioned and practically worthless. Yet in this magnificent exposition of track appliances, we see what costs fabulous sums to produce, spread out for our inspection, criticism or approval, with only the inherent faith of the manufacturers that we will approve what we need and that our employers will purchase these necessities upon our request.

PROGRESS ON RATE ADVANCE CASE

ON Monday, May 7, the Interstate Commerce Commission opened hearings on the application of the railroads for a 15 per cent increase in freight rates. The railroads presented their case and completed all the testimony by May 11. The hearing was resumed on May 23, at which time the railroad witnesses were recalled to be cross questioned by representatives of the shippers and the state commissions. Arguments of the contestants will be heard on June 9, 11 and 12.

In the presentation of the railways' case, statements were read by the presidentsof a number of leading railroads in various parts of the country. General data were presented to show that the advance in rates would not cover the increase in the cost of operating necessities,

which would add $217,000,000 to the annual expenses, while the rate advance would add only $142,000,000 to the revenues. Each of the railway executives in turn presented figures to show the increases in expenses on his road. Samuel Rea, president of the Pennsylvania Railroad, estimated the increase in fuel alone at $15,099,000, the increase in material prices $14,694,000, the increase due to the Adamson law $10,757,000, the increase in other wages $10,842,000 and an increase in taxes $500,000. Commissioner Clements asked L. E. Wettling, statistician of the western lines, if it would then be necessary for the roads to ask another advance, because the proposed advance is not expected to equal the increase in expenses. The witness replied that he hardly thought so if business continued to increase and prices were readjusted later.

R. H. Aishton, president of the Chicago & North Western, gave a comparison of the equipment costs that indicated the conditions now imposed upon the roads. During the past 10 years the North Western has spent an average of about $6,000,000 per annum for an average of 4,000 freight cars, 94 passenger cars and 94 engines. In 1917 the railroad expended $6,400,000 for equipment that included only 2,000 coal cars and 50 locomotives. Julius Kruttschnitt, chairman of the Southern Pacific, called attention to the fact that the war traffic will subordinate economy of operation to expeditious service and will be handled at less than the commercial rates. The movements of troops will be entirely one way, requiring empty return movements. W. B. Biddle, vice-president of the St. Louis-San Francisco, amplified the statement in regard to reduced rates, estimating that passenger service for the government will be handled at 57 per cent of the regular passenger rates and government supplies will be handled at 62 per cent of the commercial freight rate.

RAIL PRODUCTION IN 1916

ACCORDING to a bulletin just issued by the American Iron and Steel Institute, New York, based on statistics furnished by the various manufacturers, the total production of rails in the United States during 1916 was 2,854,518 tons. This is 650,315 tons more than the production of 1915 and nearly double that of 1914. It is less, however, than the production in every year between 1902 and 1913, inclusive, except 1904, 1908 and 1911. The figures given include rails rolled for export, but the report does not separate those from the rails manufactured for domestic use.

PRODUCTION OF RAILS BY PROCESSES, IN GROSS TONS

Years	Open-hearth	Bessemer	Rerolled*	Electric	Iron	Total
1902	6,029	2,935,392	.....	.....	6,512	2,947,933
1903	45,054	2,946,756	.....	.....	667	2,992,477
1904	145,883	2,137,957	.....	.....	871	2,284,711
1905	183,264	3,192,347	.....	.....	318	3,375,929
1906	186,413	3,791,459	.....	.....	15	3,977,887
1907	252,704	3,380,025	.....	.....	925	3,633,654
1908	571,791	1,349,153	.....	.....	71	1,921,015
1909	1,256,674	1,767,171	.....	‡	.....	3,023,845
1910	1,751,359	1,884,442	.....	‡	230	3,636,031
1911	1,676,923	1,053,420	91,751	462	234	2,822,790
1912	2,105,144	1,099,926	119,390	3,455	.....	3,327,915
1913	2,527,710	817,591	155,043	2,436	.....	3,502,780
1914	1,525,851	323,897	95,169	178	.....	1,945,095
1915	1,775,168	326,952	102,083	.....	.....	2,204,203
1916	2,269,600	440,092	144,826	.....	.....	2,854,518

*Rerolled from old steel rails. Included with Bessemer and open-hearth steel rails from 1901 to 1910 inclusive. ‡Small tonnages rolled in 1909 and 1910 but included with Bessemer and open-hearth rails for these years.

An interesting tendency is the increased use of rerolled rails, particularly those rerolled from old rails removed from track. In all 144,268 tons were rerolled in 1916 as compared with 102,083 tons in 1915 and 95,169 tons in 1914. The relative proportions of rails manufactured according to the Bessemer and open-heart processes is practically the same as the year before, the Bessemer rails forming 15.42 per cent of the total in 1916 and 14.82 per cent in 1915.

One of the tables shows the production of rails classified according to weights of rail sections and it is seen that the totals for 1916 differ materially from those of the previous year. As between 1915 and 1914 there was a decrease of 125,000 tons in the production of rails weighing 85 lb. and under 100 lb. per yard and an increase of 160,000 tons in the production of rails weighing 100 lb. and over, while the corresponding comparison between 1915 and 1916 shows an increase of only 77,856 tons for the rails weighing 100 lb. and over and an increase of 482,525 tons in the production of rails weighing 85 lb. and less than 100 lb.

PRODUCTION OF RENEWED AND REROLLED RAILS, 1911-1916

Years	Rerolled from new seconds, new defective rails, etc. Open-hearth	Bessemer	Total	Rolled from old rails	Total rerolled
1911	2,631	19,379	22,010	91,751	113,761
1912	13,140	29,446	42,586	119,390	161,976
1913	13,052	30,741	43,793	155,043	198,836
1914	13,538	13,234	26,772	95,169	121,941
1915	6,477	2,652	9,129	102,083	111,212
1916	1,711	2,149	3,860	144,826	148,686

PRODUCTION OF RAILS BY WEIGHT PER YARD, 1902-1916

Years	Under 45 pounds	45 and less than 85	85 and less than 100	100 pounds and over	Total Gross tons
1902	261,887	2,040,884	645,162		2,947,933
1903	221,262	1,603,088	1,168,127		2,992,477
1904	291,883	1,320,677	672,151		2,284,711
1905	228,252	1,601,624	1,546,053		3,375,929
1906	284,612	1,749,650	1,943,625		3,977,887
1907	295,838	1,569,985	1,767,831		3,633,654
1908	183,869	687,632	1,049,514		1,921,015
1909	255,726	1,024,856	1,743,263		3,023,845
1910	260,709	1,275,339	2,099,983		3,636,031
1911	218,758	1,067,696	1,536,336		2,822,790
1912	248,672	1,118,592	1,960,651		3,327,915
1913	*270,405	‡967,313	2,265,062		3,502,780
1914	*238,423	‡309,865	868,104	528,703	1,945,095
1915	*254,101	‡518,291	742,816	688,995	2,204,203
1916	*295,535	‡566,791	1,225,341	766,851	2,854,518

*Includes rails under 50 pounds. ‡Includes 50 pounds and less than 58 pounds.

WHAT MATERIALS ARE COSTING

THERE has been so much discussion of the advance in prices of materials that everyone has a rather general idea of what the railroads are contending with in the purchase of supplies of all kinds necessary to maintain their proprieties. It is not often, however, that this matter is put into as concrete a form as that contained in a bulletin of the Southern Pacific, which gives a list of prices of materials, equipment and devices used by the railroad, showing what these articles cost in May, 1915, what they cost in May, 1917, and the per cent of increase in the two years. The following is a list of some of the items appearing in this bulletin:

		PRICE May, 1915	PRICE May, 1917	Per Cent. Increase
Spikes	per ton	30.00	69.00	130
Bolts	" "	36.40	80.00	120
Angle Bars	" "	29.00	53.00	83
White Lead	" "	45.00	203.80	353
Nails	" "	29.00	59.00	103
Cast Iron Pipe	" "	16.50	45.00	173
Switch Points	" "	40.00	70.00	75
Manila Rope	" "	19.50	38.00	95
Frogs	each	44.50	84.50	90
Insulated Joints	"	3.85	7.35	91

RAILWAY ENGINEERING ASSOCIATION WORK

The Subjects Assigned to the Twenty-Four Committees for Investigation and Report. Names of the Chairmen

THE American Railway Engineering Association has completed the assignment of subjects for investigation by the 22 standing and 2 special committees. These subjects are given below with the names of the chairmen of the committees. New standing committees have been created on Economics of Railway Operation and Economics of Railway Labor,

1—ROADWAY

W. M. Dawley, assistant engineer, Erie, New York City.

Methods of determining the extent, character and effect of subsidence under embankments.

Select a number of specific instances of shrinkage of embankments, reciting all the conditions, such as locality, weather, foundations, character of filling material, height of fill, method of construction, etc., to be used as a guide in estimating shrinkage.

Report on the prevention and cure of water pockets in roadbed.

Continue the study of unit pressures allowable on roadbeds of different materials, coöperating with the special committee on stresses in railroad track.

Consider and report on the best method for draining the roadway through stations and yards.

2—BALLAST

H. E. Hale, group engineer, Presidents' Conference Committee on Valuation, New York City.

Report on ballast sections, with particular reference to sub- and top-ballast.

Report on the proper depth of ballast of various kinds to insure the uniform distribution of loads on the roadway, conferring with the special committee on Stresses in Railroad Track and the committee on Roadway.

Report on the methods and cost of applying ballast, with especial reference to the following plans:

(a) Organization of the most economical ballast gang of railway company forces.

(b) Use and limitations of mechanical tools, such as the pneumatic tamper and the spreader for forming shoulder and path.

(c) Application by contract.

Report on the comparative merit of different stones and gravel and other material for ballast.

Report on the different kinds of physical tests of ballast (chemical also, if necessary), and the manner of conducting them, and recommend the tests which are considered necessary and sufficient to form a guide for comparing the suitability of various stones and other material for ballast.

3—TIES

F. R. Layng, engineer of track, Bessemer & Lake Erie, Greenville, Pa.

Continue the study of the effect of the design of tie plates and track spikes on the durability of cross-ties.

Report on methods in use by various railways for controlling tie renewals.

Recommend proper dimensions for cross-ties.

Report on trials of substitute ties.

4—RAIL

John D. Isaacs, consulting engineer, Southern Pacific, New York City.

Make critical examination of the subject-matter in the Manual, and submit definite recommendations for changes, giving special attention to the rail designs recently adopted and to the specifications for carbon steel rails and joint bars.

Report on rail failures, present statistics and conclusions as to the causes and submit suggestions for improvement.

Continue the special investigation of rails.

Report on track bolts and nutlocks.

(a) Report on the details of manufacture and mill practice as they affect rail quality.

(b) Continue the research on the possibility of various improvements in methods of manufacture of steel rails.

Make a critical study of joint bars from the standpoint of design and material, together with laboratory tests, including strain-gage measurements, after having established a uniform method for comparative testing.

Report on the relative value of material for joint bars, quenched only versus quenched and tempered, and whether it is most advantageous to quench in oil or water, submitting specifications therefor.

Report on the rational relation between intensity of pressure due to wheel loads and resistance of rail steel to crushing and deformation.

Continue the investigation and development of methods of inspection.

Report on Federal and State commission rulings.

5—TRACK

G. J. Ray, chief engineer, Delaware, Lackwanna & Western, Hoboken, N. J.

Report on typical plans of turnouts, crossovers, slip-switches and double crossovers, and prepare detailed plans for such work, including such incidentals as tie plates, rail braces, riser plates, etc., conferring with the committee on Signals and Interlocking.

Report on the reduction of taper of tread of wheels to 1 in 38 and on canting the rail inward.

Report on the test of tie plates subject to brine drippings.

Report on specifications for relayer rail for various uses.

Consider the advisability of reducing allowable flat spots on freight car wheels, collecting data as to damage done by flat spots.

Consider the design of cut track spikes.

Report upon the effect of fast trains upon the cost of maintenance of way and equipment.

Report on whether the widening of the flange of the wheels would not be detrimental to the present standard of track construction.

6—BUILDINGS

M. A. Long, assistant to chief engineer, Baltimore & Ohio, Baltimore, Md.

Report on coaling stations.

Report on freight-house and passenger station scales.

Report on ash pits.

Report on a classification of buildings on the basis of "Specification Types," and upon the use of the "cubic foot," "square foot" and "bill of particulars" methods for ascertaining the approximate cost of new construction.

Report on safety-tread devices for stations exposed to the elements.

Report on the general subject of roadway buildings.

Report on the design and merits of high and low platforms at passenger stations.

Report on design of shop buildings.

Report on comparison of "umbrella" versus "butterfly" sheds at through stations.

7—WOODEN BRIDGES AND TRESTLES

E. A. Frink, principal assistant engineer, Seaboard Air Line, Norfolk, Va.

Report on the design of docks and wharves; coal and ore wharves, including various details, such as bulkheads, cribwork, dry docks, ferry slips, jetties, jetty inclines and the necessary machinery, conveyors and fixtures for the economical operation of property of this character.

Report on the comparative merits and economic features of ballast deck and reinforced concrete trestles, taking into consideration the design of ballast floors for timber trestles, and collecting data as to costs of various types of each class of structure.

Continue the study of the use of lag screws in trestle construction.

8—MASONRY

F. L. Thompson, assistant chief engineer, Illinois Central, Chicago, Ill.

Report on the cost and method of constructing concrete piles, and make recommendations on how and where they should be used.

Present additional typical designs for concrete piles for different loadings, and rules for driving under various conditions and loadings.

Continue the study of typical designs of foundations for piers, abutments, retaining walls and arches in various soils and depth of water (not including pneumatic foundations).

Report on the wisdom of the use of blast furnace slag in reinforced concrete work, taking into especial consideration its probable duration.

Report on designs and recommended specifications for construction of concrete culvert pipe.

9—SIGNS, FENCES AND CROSSINGS

W. F. Strouse, assistant engineer, Baltimore & Ohio, Baltimore, Md.

Report on subject of "Signs" and the principles of design, and rules for their use, considering the adoption of a standard sign for general use, as far as possible. Study in this connection, in collaboration with the Committee on Signals and Interlocking, the design of suitable day and night (if necessary) marks or signs for switch signals, derail switches, stop posts, slow posts, resume-speed posts, water-station and track-pan markers, highway crossing signals, etc. Also consider the location of signs, having in mind the matter of safety of employees obliged to use the roadway.

Report on legal requirements relative to the provision of fences for right-of-way and of stock-guards.

Report on the classification of fences into "types."

Make a comprehensive study of crossings: (a) Grade crossings: Crossing gates, crossing signal bells, warning signals. (b) Over and under grade crossings: Study the laws and requirements of the Federal government, of the various states, provinces or of municipalities which affect the distribution of cost as between the carrier and the public.

Make a careful investigation of all styles of manufactured parts that have been in use long enough to warrant any conclusion as to their durability, with particular attention to: (a) A study of various types of end or strain posts used with steel fence posts, with a view to recommending a type which would be a satisfactory substitute for posts set in concrete, the cost of which is high in those now in use; (b) an investigation as to the best method of bracing concrete end or strain posts; (c) a further study of the subject of concrete fence posts now in use by various railroads.

Submit a revised analysis of the comparative annual cost of fences, using wood, metal and concrete posts.

10—SIGNALS AND INTERLOCKING

J. A. Peabody, signal engineer, Chicago & Northwestern, Chicago, Ill.

Report on the problem of signaling single-track roads with reference to the effect of signaling and the proper location of passing sidings on the capacity of the line.

Report on the desirability of having an overlap in automatic signaling; if so, is it best to have two stop indications between trains or two caution indications instead, or the latter in special cases only, such as down-grade tracks?

Report on the various methods of giving signal indications other than by means of the semaphore (this includes the light signal for day and night indications).

Report on the feasibility of separating into distinct types of their own (a) the signals for train operation, and (b) the markers or signs which indicate the location or position, or both, of information signs and switch signals for conveying information to trainmen: (a) The semaphore is now almost universally used for governing train operation, therefore (b), design suitable day and night (if necessary) markers or signs for switch signals, derail switches, stop posts, slow posts, resume speed posts, water-station and track-pan markers, highway crossing signals, etc., conferring with the Committee on Signs, Fences and Crossings.

Report on requisites of signal locations for interlocking and block signals.

Report on automatic train control.

Report on the comparative merits in various locations of alternating current and direct current for operation of automatic signals.

Report on applications of aspect for instructions to trains to take siding at a non-interlocked switch.

11—RECORDS AND ACCOUNTS

W. A. Christian, senior civil engineer, Division of Valuation, Interstate Commerce Commission, Chicago, Ill.

Report on the use of small forms on cardboard or other suitable material for the use of fieldmen in making daily reports, to the end that supervision may be facilitated and efficiency encouraged.

Report on feasible and useful sub-divisions of the Interstate Commerce Commission "Classification of Investment in Road and Equipment" and "Classification of Operating Expenses" of steam roads.

Report on various methods of reproducing maps and profiles on tracing linen for permanent records.

Make a comprehensive study of the problem of recording and reporting the cost of additions and betterments.

Submit specification for maps and profiles, co-ordinating them with previous work of the Association.

Report on valuation forms now in use and recommend forms for both field and office use.

Report on cost keeping methods and statistical records.

Report on a systematic arrangement for final plans in connection with estimates.

Report on the allocation of maintenance of way expense to passenger and freight service.

Report on additional definitions.

Report the following forms:

For Maintenance of Way and Structures: (a) form for monthly report of track tools; (b) form for monthly report of roadway machines; (c) form for final report of materials used in tracks.

For Construction: (a) form for monthly estimates of work done by contractors; (b) form for track-laying reports; (c) form for track-ballasting reports; (d) form for keeping material account; (e) form for keeping itemized cost record; (f) form for final detailed report and record.

For Records: (a) form for building record; (b) form for water service record; (c) form for fuel station record; (d) form for shop machinery and tool record.

12—RULES AND ORGANIZATION

C. Dougherty, chief engineer, Queen & Crescent Route, Cincinnati, Ohio.

Prepare a "manual of instructions for the guidance of engineering field parties."

Continue the study of the science of organization.

Prepare a manual of rules for the guidance of employees of the maintenance of way department.

13—WATER SERVICE

A. F. Dorley, engineer maintenance of way, Missouri Pacific, St. Louis, Mo.

Continue the study of methods of complying with federal regulations in regard to the purity of the drinking water supplied to trains.

Make a final report on the design of impounding reservoirs, and the conditions under which they are economical.

Make a final report on the relative merits of continuous and intermittent water softeners.

Make a final report on rules or examination questions for the care of boilers in pumping stations.

Report on the organization for a railway water service department.

Report on definitions of terms used in railway water service.

Report on suitable types of water meters for use in railway water service, the methods followed in testing and reading meters and checking the consumption of city water.

14—YARDS AND TERMINALS

E. B. Temple, assistant chief engineer, Pennsylvania Railroad, Philadelphia, Pa.

Report on handling of freight in double-deck freight houses and the cost of operation. Also report on the handling of freight by mechanical means.

Continue the study of typical situation plans of passenger stations and methods of their operation.

Report on classification yards.

15—IRON AND STEEL STRUCTURES

O. E. Selby, principal assistant engineer, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati, Ohio.

Report on methods of protection of iron and steel structures against corrosion.

Report on the relative economy of various types of movable bridges.

Report on secondary stresses and impact.

Report on column tests.

Report on design, length and operation of turntables.

Report the present practice in construction of ballast floor bridges and methods in use for waterproofing.

16—ECONOMICS OF RAILWAY LOCATION

R. N. Begien, general manager, Baltimore & Ohio, Eastern Lines, Baltimore, Md.

Report on the resistance of trains running between 35 and 75 miles per hour.

Report on the effect of curvature on cost of maintenance of way.

Report on the effect of curvature on maintenance of equipment.

Report on the effect of train resistance on the amount of fuel consumed.

Report on the entire question of economics of location as affected by the introduction of electric locomotives.

17—WOOD PRESERVATION

Earl Stimson, engineer maintenance of way, Baltimore & Ohio, Baltimore, Md.

Report on the compilation of service test records and extend them to include treated timbers in bridges, docks and wharves. Include also a critical study of the records of service given by zinc-chloride treatment and state definitely the results which may be obtained from that treatment.

Report on the merits of water gas tar as a preservative, taking samples of the preservative from timbers which have been in service, in order to determine its quality.

Co-operate with similar committees of other associations with the object of obtaining uniformity in practice and specifications, and report thereon.

18—ELECTRICITY

George W. Kittredge, chief engineer, New York Central, East of Buffalo, New York City.

Keep up to date all statistical data relative to clearances of third-rail and overhead structures.

Report on the study of electrolysis and insulation and its effect upon reinforced concrete structures.

Report on the study of the maintenance organization, and its relation to track structures.

Report on proper type of overhead catenary construction, with particular reference to the consideration of providing clear vision for signals, co-operating with the committee on Signals and Interlocking.

Report on the utilization of water power for electrical railway operation, in collaboration with the committee on Conservation of Natural Resources.

Report recommended practice for eliminating, as far as practicable, the interference with telephone and telegraph lines caused by the use of propulsion circuits.

Report on the interference with telegraph and telephone circuits caused by the use of a direct-current propulsion circuit and methods of eliminating this effect as far as is practicable.

Continue co-operation with the national joint committee on Electrolysis and the national joint committee on Overhead and Underground Line Construction.

Study and make a report on any desirable changes in the National Electrical Safety Code issued by the Bureau of Standards.

19—CONSERVATION OF NATURAL RESOURCES

R. C. Young, chief engineer, Lake Superior & Ishpeming, Marquette, Mich.

Continue the study of tree planting and general reforestation.

Collect statistics on the extent of the use of treated timber and of permanent materials to replace untreated timber and bare steel. Report on the conservation and utilization of water power for railway purposes, conferring with the committee on Electricity.

Report on the study of coal, fuel-oil, timber, iron and steel resources.

Report on the relation of the railways to the different conservation projects, reviewing work that has been done by each company up to the present time, and make recommendations on policies economical for railways to follow.

Report on measures for the conservation of human life and energy, in order to promote efficiency.

20—UNIFORM GENERAL CONTRACT FORMS

E. H. Lee, vice-president and chief engineer, Chicago & Western Indiana, Chicago, Ill.

Report on forms of agreements for industry tracks.

Report on forms of agreements for interlocking and railway crossings, conferring with the committee on Signals and Interlocking, including the rights and obligations of the interested companies.

Report on forms of agreement embodying rules governing the construction of under-crossings of railways with electrical conductors, conduits, pipe lines and drains, conferring with the committees on Roadway and Electricity. (See work done for State Public Utilities Commission of Illinois.)

Report on a form of lease agreement for industrial site.

21—ECONOMICS OF RAILWAY OPERATION

F. W. Green, assistant to the vice-president, St. Louis Southwestern, St. Louis, Mo.

Study the relations between railway operation and the location, construction and maintenance of railways, and report on the possible scope and field of action which should be assigned to the committee on Economics of Railway Operation.

22—ECONOMICS OF RAILWAY LABOR

E. R. Lewis, assistant to general manager, Duluth, South Shore & Atlantic, Duluth, Minn.

Study and report on the Economics of Railway Labor.

GRADING OF LUMBER

Dr. Hermann von Schrenk, consulting timber engineer, St. Louis, Mo.

Report on classifications and grading rules for all lumber and timber used in the construction and maintenance of way departments of railways.

Report on specifications for construction timbers and building lumber.

From the two preceding studies draw up in unified form a set of specifications for construction timbers and building lumber for use on railways, showing each kind and quality of lumber or timber which is suitable for each of the different classes of work on a railway.

Report on specifications for timber which is to be treated with a preservative substance, co-operating with the Committee on Wood Preservation. Confer with Committee No. 7.

STRESSES IN TRACK

A. N. Talbot, professor of municipal and sanitary engineering, University of Illinois, Urbana, Ill.

A NEW KIND OF RAIL TROUBLE

A NUMBER of railway men are now deeply interested in a new rail problem which has appeared within the last few months and which is evidenced by the progressive formation of lips at the ends of the rails which chip off and soon create bad riding joints. The metal evidently flows longitudinally until the pressure on the adjoining rails causes it to break out. Measurements have shown that the depth of these breaks is as much as 1/16 in.

While present observations lead one to believe that this action is confined to rails rolled recently, it is evidently not limited to those from any one mill or group of mills. Neither is it confined to any particular type of joint, for it has been found in rails with both patented joints and plain angle bars. Analyses of the metals in such rails has shown them to be as sound and homogeneous as might reasonably be expected without any indications of soft steel. Microscopic examinations have also failed to indicate any difference in the structure of the metal which might suggest a decarburized surface or envelope about the head of the rail. This would indicate that the cause will be found in some mechanical action.

It has been suggested that the common practice of leaving a small burr on the end of the top of the rail head because of an insufficient amount of filing after the end of the rail has been chipped free of the burr left by the hot saws might contribute in some measure to this trouble. In an endeavor to eliminate the bevel at the end of the rail which leads to early battering this burr is not always filed entirely off. The elongation of this burr under traffic until it chips off might lead to the results described.

There would seem also to be no reason why rail steel should not flow longitudinally as well as transversely with respect to the track. It is commonly conceded that rail steel flows transversely, particularly during the first few months of service and it would not be surprising if similar flow is extended longitudinally. This might readily lead to the conditions in question. If this flow bridges over the open space of the joint, the expansion during

warm weather will eventually lead to the nicking out of the section.

Another explanation is offered by the fact that rails differ in height more than might be commonly expected, and this variation probably increases with the height of the section. This condition has been overcome on street railway lines by grinding the rail heads to a common level and it has been suggested that the grinding of the rail heads at the joint may be one means of eliminating the present trouble.

Up to the present time the causes of this condition have not been explained satisfactorily. However, further investigations and experiments now under way may lead to their determination.

EQUIPMENT TO MOVE AN ARMY

THE average railway man has no conception of the magnitude of modern military operations or of the problems imposed in moving large bodies of troops. For this reason bulletin No. 2, recently issued by the American Railway Association's special Committee on National Defense, is of general interest. The data in the bulletin was prepared by Lieutenant-Colonel Chauncey B. Baker, of the Quartermaster Corps, United States Army, and distributed to the railroads of the country by this committee.

To move one field army of 80,000 men, consisting of three infantry divisions, one cavalry division and a brigade, technically known as a brigade of field army troops—troops auxiliary to the infantry and cavalry divisions—requires a total of 6,229 cars made up into 366 trains with as many locomotives. These 6,229 cars would be made up of 2,115 passenger, 385 baggage, 1,055 box, 1,899 stock and 775 flat cars. This quantity of equipment represents 0.7 per cent of the locomotives owned by American railroads, 4.2 per cent of the passenger cars, and 0.2 per cent of their freight equipment.

The railroad equipment required to move various organizations of the army at war strength is as follows:

Infantry Regiment
55 officers, 1,890 men
177 animals, 22 vehicles
Cars required
48 passenger cars
5 baggage cars
15 box cars
9 stock cars
8 flat or gondola cars
Total, 85 cars

Artillery Regiment—Mountain
45 officers, 1,150 men
1,229 animals
24 guns
Cars required
30 passenger cars
7 baggage cars
30 box cars
61 stock cars
Total, 124 cars

Artillery Regiment—Light
45 officers, 1,170 men
1,157 animals, 32 vehicles
24 guns
Cars required
32 passenger cars
9 baggage cars
25 box cars
58 stock cars, 46 flat cars
Total, 170 cars

Signal Corps
Field Battalion
9 officers, 171 men
206 animals, 15 vehicles
Cars required
6 passenger cars
2 baggage cars
5 box cars
10 stock cars
5 flat cars
Total, 28 cars

Cavalry Regiment
54 officers, 1,284 men
1,436 animals, 26 vehicles
Cars required
36 passenger cars
8 baggage cars
25 box cars
72 stock cars, 9 open cars
Total, 150 cars

Engineers
Pioneer Battalion
16 officers, 502 men
165 animals
12 vehicles
Cars required
14 passenger cars
2 baggage cars
10 box cars
8 stock cars
4 flat cars
Total, 38 cars

Artillery Regiment—Horse
45 officers, 1,173 men
1,571 animals, 35 vehicles
24 guns
Cars required
34 passenger cars
10 baggage cars
25 box cars, 78 stock cars
47 flat cars
Total 194 cars

THE MATERIAL MARKET

WHILE the market for most railway materials has been in an abnormal state for nearly three years, the conditions resulting from the present crisis eclipse anything that has gone before. In addition to the continued needs of the allies for all things necessary for war and the requirements of American industries and those of the railroads for the maintenance and extension of their facilities to take care of the greatest business they have ever had, the United States Government has now entered the market as a buyer to be considered.

A few activities of government purchasing agents have been brought to notice which will undoubtedly have some bearing on the supply of materials for railways. For instance, many of the structural steel shops hesitate to take further orders until they know just what action the Government will take in connection with an investigation recently made of the possibility of utilizing the bridge shops of the country for the fabrication of the steel frames of ships. The government ship building program has also taken definite form in a recent order for 2,000,000,000 ft. b. m. of yellow pine. This is equivalent to nearly one-seventh of the total production of this species of wood in this country for 1916. It is also estimated that 24,000 tons of wire rope are needed by our government and its allies and European inquiries were recently received for 12,000 tons of wire nails.

The tendencies of manufacturers to postpone the taking of further business for future delivery because of present uncertainty has been indicated in the rail market as the mills are delaying action on railway inquiries for 1919 rail. A few more orders have been placed for rail for delivery late in 1918, of which the largest is one for 30,000 tons for the Union Pacific. The Michigan Central bought 5,000 tons and the Ann Arbor and Clover Leaf each 3,000 tons. Russian, English and Swedish rail inquiries total 265,000 tons. Consequently it is not surprising that relayers are selling for as much as new rails, while rails suitable for rerolling are quoted at $34 to $37. All scrap material is high. The Nickel Plate recently sold a consignment at $38.10 per ton.

Angle bars are now selling for 3 to 3.5 cents per lb. at Pittsburgh and 2.75 to 3 cents at Chicago. Tie plates are $60 to $70 per ton; track spikes bring $3.85 to $4 per keg at Pittsburgh and $4 to $4.15 at Chicago; track bolts are $5.50 at Pittsburgh and $5 to $5.15 at Chicago; nails are $3.50 per keg and galvanized barbed wire is $4.35 per 100 lb. A purchase by the Louisville & Nashville of 25,000 kegs of track spikes is noted. Wrought iron and steel pipes are said to be sold up to the end of the year. Cast-iron pipe, while easier to secure, has advanced $10 per ton in the last two months. It is now $58.50 per ton for four-inch water pipe and $55.50 for six-inch or larger.

Although fabricated steel costs in the neighborhood of seven cents per pound, the bridge companies continue to receive orders for some tonnage from the railroads. The largest recent contract was one for 3,090 tons for a viaduct for the Chicago Union Station Company. The Pennsylvania Railroad has ordered over 1,000 tons for various small bridges and a shop building.

The lumber industry is also experiencing a rising market, with advances of $1 to $2 all along the line and prospects of further advances, with further purchases by the government and general substitutions of lumber for other materials at present more difficult to secure. Cement also is higher, now being quoted at $1.91 for Chicago and Pittsburgh, $2.04 for Cleveland, Indianapolis and Toledo, and $2.18 for Minneapolis and St. Paul.

GENERAL NEWS DEPARTMENT

THE ERIE has withdrawn 77 passenger trains from service with a view to providing more engines and men to run freight trains. Most or all of the trains to be taken off are those running in local or suburban service in the state of New Jersey.

IN SOUTH CAROLINA a law has recently been passed which makes illegal the use for advertising purposes of the crossing signs found at electric and steam railroad crossings. There is a penalty for non-observance of this law and the supervisors of the counties are required to remove existing signs.

THE MONTANA SUPREME COURT held in a recent action by a track man for damages that his injury resulting in a rupture was due to the foreman's order that the plaintiff with three others lift a rail, for which work eight men have been used, and the mere fact that four men had lifted another rail of equal size and weight in a different location did not mean that the rail was not too heavy.

THE WALSH CONSTRUCTION COMPANY, the McCarthy Improvement Company, both of Davenport, and the Dunn-McCarthy Construction Company of Chicago have offered the War Department the plants and trained railroad construction forces of these companies for service in the United States, France, Russia or elsewhere. The three companies own one of the largest railroad construction organizations in the country.

THE RAILROADS OF THE COUNTRY, under the direction of the United States government, have recently placed an embargo on arms and ammunition consigned to the Mexican border. Hereafter no shipments may be moved to Mexican border points unless covered by a government bill of lading or expressly approved by the war department. The prohibition not only covers the acceptance of shipments at points of origin, but also in transit.

THE CONNECTICUT LEGISLATURE has passed a law to punish any person who without right is on any engine or car, or on any platform or grounds of any station or yard of any railroad, or on the track or right of way; or who rides, drives or leads any beast on such track, by a fine of $50 or imprisonment for not more than 30 days or both. Every station agent who has information of a violation of the law must notify the proper officers.

THE UNITED STATES RAILROAD COMMISSION to Russia, which sailed for Petrograd recently, consists of John F. Stevens, formerly chief engineer of the Panama Canal; W. L. Darling, formerly chief engineer of the Northern Pacific; Henry Miller, formerly operating vice-president of the Wabash; George Gibbs, electrical engineer of the Long Island, and J. P. Greiner, consulting bridge engineer of the Baltimore & Ohio. Mr. Stevens is chairman of the commission and has been given the rank of minister plenipotentiary.

A. J. EARLING, president of the Chicago, Milwaukee & St. Paul, has given $1,500 for distribution as prizes to people living along the Milwaukee lines who produce the best gardens this summer. A prize of $50 has been set aside for each division of the entire system for the largest yield per acre for any single commodity, while two prizes of $100 each will be awarded for the best all-around vegetable garden. Prof. P. G. Holden, agriculturist, will assist the various division superintendents in arranging details, and will personally supervise the distribution of the awards.

THE TEXAS & PACIFIC has issued a notice to all of its section and machine shop foremen that the right of way is available for immediate cultivation, and in order to provide an adequate supply of labor each of these employees is given one-half a day a week of the company's time to perform this work. The employees will share in the crops thus grown according to the number of hours the man works, including the one-half day of the company's time allowed, and the extra time that he may put in. Particular attention is to be given to the growing of vegetables, such as tomatoes, cabbage, beans, radishes, potatoes and corn. The planting of cotton is prohibited.

THE RELIEF DEPARTMENT of the Baltimore & Ohio now carries in its membership 52,771 employees of that road. Through the aid of the loan department, 5,791 employees are now purchasing homes, while $5,604,528 is deposited in the savings department.

THE ILLINOIS CENTRAL, through its general manager, T. J. Foley, asks the co-operation of farmers along the railroad right of way in keeping their live stock off the tracks. Although the right of way is fenced, farmers are careless in leaving the fence gates open with the result that there have been great losses of cattle, hogs, horses and mules, which have been run down by trains. In the last five years 5,000 head of horses and mules, 16,000 head of cattle and 11,500 head of hogs have been killed on the Illinois Central tracks, equal to an average of 125 animals a week.

THE CANADIAN GOVERNMENT, in order to supply rails for the railroads on the west front in France, has taken up 135 miles of track of the Grand Trunk Pacific and 75 miles on the Canadian Northern, west of Edmonton, Alta., where these roads are parallel. Government engineers have inspected these roads and have made arrangements that will still insure adequate transportation facilities for all the towns and mines along the line. The rails being sent to France are all from the Grand Trunk Pacific, while those from the Canadian Northern have been transferred to the Grand Trunk Pacific tracks. The first rails sent across in February last were taken from the National Transcontinental. The second request carried with it a condition that rails of the same section be sent forward. These were only available on the Transcontinental and the Grand Trunk Pacific. For this reason the Canadian Northern rails were transferred to the Grand Trunk Pacific to release those to meet the requirements of the allied armies.

THE PENNSYLVANIA RAILROAD has decided to offer employment to women and girls wherever possible on its system. No men will be dropped from the payroll to make way for women, although some may be called upon to change the form of their occupation. Stenography, typewriting and clerical work will be open to women employees at once, and if on investigation it is found practical, employment will be opened to them in lighter forms of machine shop work, telegraphy, telephony, signaling, ticket selling and car cleaning. This step is taken to aid in the conservation of labor and to conform with the necessities created by the present national crisis. The Baltimore & Ohio has also adopted a policy of employing women, which will become effective at once, because of the shortage of men. It is planned to employ women in any capacity which they can fill, including car repairers, switch women, crossing guards, signal women and clerical work. The women will draw the same wages as men occupying similar positions and in Ohio, in order to meet the state law, will work a maximum of only 50 hours a week.

THE RAILROADS OF THE UNITED STATES are making concerted efforts to increase food production along their lines. One of the most interesting activities in this direction is the arrangement of the Buffalo, Rochester & Pittsburgh for a fleet of tractors for use on farms along its lines in New York and Pennsylvania. If the demand for these is sufficient, it is planned to equip them with electric headlights so that they may be operated at night. In the west the Union Pacific is conducting a campaign under the direction of Perry G. Holden, agricultural director of the International Harvester Company. More than 500 meetings have been scheduled along the lines of this road, and 25 speakers have been obtained for lectures and talks to be given at these meetings. The Georgia Northern is encouraging the production of sweet potatoes and has announced that it will arrange for ample warehouses to store and cure the crops at the various central shipping points. The Pennsylvania Railroad has had printed a booklet, entitled "Raise Potatoes and Help to Win the War," and is about to distribute it to farmers and residents in towns and suburbs along its line.

PERSONAL MENTION

GENERAL

C. R. KULP, division engineer on the Chicago & North Western, at Antigo, Wis., has been appointed trainmaster at Benld, Ill., succeeding F. R. Lloyd, transferred.

A. L. CLAPP, roadmaster of the Chicago & North Western at Chicago, Ill., has been promoted to trainmaster of the Galena division, with the same headquarters.

E. J. CORRELL, district engineer maintenance of way of the southwestern district of the Baltimore & Ohio, with headquarters at Cincinnati, Ohio, and formerly division engineer of the Illinois division, has been appointed superintendent of the Delphos division of the Cincinnati, Hamilton & Dayton, with headquarters at Dayton, Ohio, succeeding R. B. Mann, transferred.

F. P. GUTELIUS, general manager of the Canadian Government Railways, who has been appointed vice-president of the Delaware & Hudson, effective June 1, received a large part of his railway training in the engineering and maintenance departments. He entered railway service with the Pennsylvania in 1887, serving as assistant engineer and assistant supervisor. Later he was division superintendent on the Canadian Pacific, and from 1900 to 1906 he held various positions in the maintenance department of this road, being promoted from engineer maintenance of way to assistant chief engineer and later to general superintendent. In 1912 he became a member of the Canadian Government Commission to investigate the National Transcontinental Railway, and was later made general manager of the Canadian Government Railway.

RITCHIE GRAHAM KENLY, chief engineer of the Minneapolis & St. Louis, with office at Minneapolis, Minn., has been appointed general manager, succeeding James Russell, resigned. He entered railway service in September, 1885, as a rodman on the Annapolis & Baltimore Short Line. From October, 1886, to March, 1891, he was assistant supervisor of the Northern Central, and from March, 1891, to July, 1893, he was a supervisor on the Norfolk & Western, later becoming assistant engineer and subsequently assistant trainmaster. From February, 1898, to November, 1904, he held various engineering positions with the West Virginia Central & Pittsburgh, the Philadelphia & Erie, the Northern Central and the Lehigh Valley, becoming trainmaster on the Lehigh Valley in 1904. He was appointed general superintendent of the Lehigh & New England in March, 1907, and in June, 1908, became engineer maintenance of way of the Lehigh Valley. In March, 1909, he was appointed chief engineer of the Minneapolis & St. Louis.

CLIFFORD STANLEY SIMS, vice-president and general manager of the Delaware & Hudson, who has been appointed general manager of the Canadian Government Railways, succeeding F. P. Gutelius, as noted elsewhere, gained a considerable portion of his railway experience in engineering and maintenance work. He entered the service of the Pennsylvania Schuylkill Valley Road in 1895, serving in various capacities on this road. He also was employed on the Pennsylvania Railroad and Pennsylvania Lines West, and in 1893 he became assistant engineer maintenance of way of the eastern division of the latter road at Ft. Wayne, Ind. He served in similar maintenance positions on this road until 1901, when he became superintendent of the Chicago Terminals division. In 1902 he became general superintendent of the New York division of the Baltimore & Ohio, being promoted to general manager in 1903. He was assistant to the president of the Erie from May, 1905, to May, 1907, when he was made vice-president of the Delaware & Hudson.

ENGINEERING

J. L. EARLE, bridge and building supervisor of the Chattanooga division of the Nashville, Chattanooga & St. Louis, with headquarters at Tallahoma, Tenn., has been appointed division engineer, with office at Nashville, succeeding R. M. Milam, who is now serving in the National Guard.

E. H. MAY, assistant division engineer of the Pennsylvania Lines, at Logansport, Ind., has been transferred to Ft. Wayne, Ind., to succeed H. T. Sympson, transferred.

W. W. KELLY has been appointed division engineer of the Albuquerque division of the Atchison, Topeka & Santa Fe, succeeding M. C. Bryan, transferred, effective May 12.

A. A. MATTHEWS, engineer maintenance of way of the Missouri, Kansas & Texas, lines south of Dallas, Tex., has been transferred to the lines north of Dallas, with headquarters at Parsons, Kan.

JOB TUTHILL, of the engineering department of the Michigan Central at Detroit, Mich., and prior to that building engineer of the Kansas City Terminal Railway at Kansas City, Mo., has been appointed chief engineer of the Pere Marquette, with headquarters at Detroit, Mich., succeeding A. L. Grandy, promoted.

W. C. BAISINGER, division engineer of the Atchison, Topeka & Santa Fe at Marceline, Mo., has been appointed to the newly-created position of assistant engineer in the construction department, with headquarters at Chicago. Irving Anderson, office engineer at Chillicothe, Ill., has been appointed division engineer of the Missouri division, with headquarters at Marceline, in place of Mr. Baisinger.

JOHN T. NAGEL, who has been appointed chief engineer of the Louisiana & Pine Bluff, with headquarters at Huttig, Ark., was born at Hamburg, Germany. He began railway work on April 1, 1901, as timekeeper on betterment work for the Rock Island & Peoria, and subsequently engaged in private engineering practice at Davenport, Iowa. Later he became connected with the Nacogdoches & Southeastern at Nacogdoches, Tex., where he had charge of location and construction. He has since supervised other engineering work for that road at various times and has also been in charge of the location and construction of several sawmill roads.

J. S. LEMOND, engineer of maintenance of way of the Southern Railway, Eastern district, has been promoted to assistant to the chief engineer maintenance of way and structures, Lines East, at Charlotte, N. C. G. E. Buckley, engineer maintenance of way of the Northern district at Richmond, Va., has been transferred to the Eastern district, succeeding Mr. Lemond. G. L. Sitton, resident engineer of the Northern district, at Richmond, has been promoted to engineer maintenance of way of the Northern district, succeeding Mr. Buckley. O. D. Colaw, inspector at Washington, D. C., has been appointed resident engineer of the Northern district at Richmond, Va., succeeding Mr. Sitton.

A. C. CLARKE, who was recently appointed assistant engineer of surveys of the Baltimore & Ohio, with headquarters at Baltimore, Md., was born in Granton, Ont., in May, 1888, and graduated from Purdue University in civil engineering. After graduation he entered railway service with the Lake Shore & Michigan Southern, and later worked for the Canadian government in various engineering capacities. Mr. Clarke returned to railroad service as a road man in the operating department of the Baltimore & Ohio. In July, 1916, he was transferred to the traffic and commercial development department. Later he became chief of the facilities bureau of this department, devoting particular attention to the accessibility and adequacy of the terminals and other facilities of the Baltimore & Ohio, and was employed in this capacity until his appointment as noted above.

WILLIAM HERBERT VANCE, whose appointment as engineer maintenance of way of the St. Louis Southwestern, with headquarters at Tyler, Tex., was noted in these columns last month, was born at Effingham, Ill., on November 6, 1876. After leaving high school he entered the University of Illinois, graduating with a degree in civil engineering in 1899. In March, 1902, he entered railway service with the Peoria & Eastern as an assistant in the engineering corps, prior to which time he had been employed, from June, 1899, to February, 1902, as an inspector and overseer by the government on improvements then being made on the Illinois River. From March, 1905, to May, 1906, he was assistant division engineer on the St. Louis, Iron Mountain & Southern, and from June, 1906, to October, 1909, he was division engineer for the Louisiana & Arkansas. In November, 1909, he was promoted to engineer maintenance of way, and in

November, 1916, was appointed chief engineer, the position he resigned to take the position noted above.

E. L. MARKHAM, assistant engineer of the St. Louis Southwestern, at Pine Bluff, Ark., has been appointed division engineer of the Northern division, with headquarters at Pine Bluff. T. J. Williams, Jr., has been appointed division engineer of the Middle division, with headquarters at Mt. Pleasant, Tex. A. W. Foscue, assistant engineer of the St. Louis Southwestern of Texas, at Tyler, Tex., has been appointed division engineer of the Southern division of the St. Louis Southwestern, with office at Tyler.

F. L. BEAL has been appointed chief engineer of the Louisiana & Arkansas, at Stamps, Ark., succeeding W. H. Vance, resigned, to go with another company. Mr. Beal was born at Salem, Ind., on August 22, 1886. He received his education at Purdue University, graduating from the course in civil engineering in 1908. In July, 1908, he entered railway service with the Cleveland, Cincinnati, Chicago & St. Louis as an instrument man, and in August, 1909, was employed by the Louisiana & Arkansas as a transit man, since which time he has been consecutively assistant engineer maintenance of way, resident engineer, chief clerk to the general superintendent, chief clerk to the general manager, valuation engineer, statistician in charge of rate cases, superintendent and valuation engineer, from which position he was promoted to chief engineer.

THE FOLLOWING APPOINTMENTS and changes in the organization and location of division engineers on the Erie became effective on May 1: O. F. Barnes, division engineer at Jersey City, N. J., in charge of the New York division and side lines, the New York, Susquehanna & Western and the Wilkes-Barre & Eastern; R. H. Boykin has been transferred from Marion, Ohio, to Susquehanna, Pa., in charge of the Delaware and Wyoming divisions and branches; R. L. Dyke has been transferred from the New York, Susquehanna & Western at Jersey City, N. J., to Elmira, N. Y., in charge of the Susquehanna, Rochester and Tioga divisions and the Bath & Hammondsport Railroad; F. S. Wheeler, at Buffalo, is in charge of the Buffalo division and branches, Allegheny division and Bradford division; F. D. Lakin has been transferred from Huntington, Ind., to Meadville, Pa., in charge of the Meadville division and branches; I. H. Schram has been transferred from Susquehanna, Pa., to Youngstown, Ohio, in charge of Mahoning division and branches; H. S. Elliott has been transferred from Hornell, N. Y., to Marion, O., in charge of the Kent division, First and Second districts, and J. R. Sexton has been transferred from Meadville, Pa., to Huntington, Ind., in charge of the Marion division, First and Second districts, and the Chicago division.

BERNARD BLUM, announcement of whose appointment as division engineer of the Northern Pacific, with office at St. Paul, Minn., was made in the last issue, was born at Chicago, Ill., February 12, 1883. He completed his education at the Massachusetts Institute of Technology in 1904, and the following year entered railway service in the engineering department of the Chicago Junction Railway. In March, 1907, he went with the Northern Pacific as an assistant engineer in Montana, and in December, 1909, he was appointed assistant division engineer at Livingston, Mont. In October, 1910, he was promoted to roadmaster for this same company at Duluth, Minn., and in November, 1911, was made assistant division engineer at St. Paul, Minn. On January 1, 1917, he was appointed acting division engineer at St. Paul, which latter position he held until promoted, as noted above, to division engineer, succeeding Louis Yager, promoted.

BERNARD BLUM.

R. D. MCKEON has been appointed acting assistant division engineer of the Pittsburgh division of the Pennsylvania Lines, with headquarters at Pittsburgh, Pa., succeeding J. L. Taylor, Jr., furloughed.

J. H. REINHOLDT, roadmaster on the Kansas City Terminal Railway, who was until March 1 principal assistant engineer of the Minneapolis & St. Louis, has been appointed chief engineer of the last-named road, with headquarters at Minneapolis, Minn., succeeding R. G. Kenly, promoted.

LOID G. HARRIS, acting division engineer of the Arkansas River division of the Atchison, Topeka & Santa Fe, with headquarters at La Junta, Colo., has been appointed division engineer of the Rio Grande division, with headquarters at San Marcial, N. M., succeeding W. J. Lank, who has resigned to engage in private engineering practice at Kansas City, Mo. Mr. Harris was born at Parsons, Kan., on August 27, 1886. He began railway work with the Atchison, Topeka & Santa Fe in October, 1905, as a chainman at Canyon City, Texas, and has been continuously in the service of that company since that time. He has been employed on different divisions in various positions, including chainman, rodman, transitman and building inspector, in which capacity he was engaged in maintenance, construction, betterment work and location surveys, until January, 1916, when he was appointed acting division engineer of the Arkansas River division. He held the latter position until his recent appointment.

LOID G. HARRIS

F. RINGER, engineer maintenance of way of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan., has been appointed chief engineer, with headquarters at Dallas, Texas, succeeding L. F. Lonnbladh, resigned. Mr. Ringer graduated from Kansas State University in 1893, and entered the service of the Missouri, Kansas & Texas in June, 1894, with which road he has remained ever since. In May, 1895, he was made office engineer in the chief engineer's office; from June, 1902, to April, 1905, he was assistant engineer, in charge of surveys for revisions of line and grade, and was then until February, 1906, resident engineer maintenance of way. On the latter date he was appointed principal assistant engineer in charge of revisions of line and grade, and in August, 1911, he became assistant chief engineer. One year later he was promoted to engineer maintenance of way, and in March, 1913, was appointed superintendent of transportation and maintenance of way, of the Mc Alester district. In October, 1914, he was appointed engineer maintenance of way, which position he held until his recent appointment as chief engineer.

ELMER L. MARTIN, who has been appointed engineer maintenance of way of the Missouri, Kansas & Texas, lines south, with office at Dallas, Tex., was born at Elgin, Tex., on July 29, 1879. He was educated at the Agricultural and Mechanical College of Texas and entered railway service with the Texas & Northern, a part of the Southern Pacific system, as an axman on location. He remained with the Southern Pacific in various capacities until promoted to assistant engineer. He resigned in July, 1901, to take a similar position with the Kansas City Southern, at Kansas City. In August, 1905, he joined the engineering forces of the Gulf, Colorado & Santa Fe on new construction in Louisiana and Texas, with the title of assistant construction engineer. From April, 1912, to March, 1913, he was assistant superintendent of the Southern Pacific lines in Texas and Louisiana, with office at Lafayette, La., and then became division engineer of the Missouri, Kansas & Texas, at Denison, Tex. In May, 1916, he was appointed resident engineer of the same company's new terminal at San Antonio, Tex., which position he held until his

appointment, as noted above, became effective. He succeeds A. A. Matthews, transferred to Parsons, Kan., as engineer maintenance of way of lines north of Denison, Tex.

NEW HAVEN REORGANIZATION

THE NEW YORK, NEW HAVEN & HARTFORD revised its organization in an effort to concentrate authority and responsibility more directly. Under the revised plans, the chief engineer reports direct to the president and has charge of all records of the property except land titles, machinery and rolling stock, telephone and telegraph, and signal appliances. He is responsible for projects and reports, engineering work, new construction and through the bridge department makes periodical inspections of the larger structures, of the floating equipment except the machinery and of such other structures as require similar attention.

The eastern and western grand divisions have been discontinued and in their places three grand divisions are created which are to be known as the "Lines East," "Lines West" and "New York division, terminals and connecting railway." The division engineers will report to the division superintendents and the engineers of the grand divisions will report to the general superintendents on all matters pertaining to the efficient and economical operation and maintenance of the property. Both the division engineers and the engineers of the district will, however, follow the instructions of the engineer maintenance of way and the signal engineer in respect to standards and methods.

The engineer maintenance of way is in charge of the road and structures, the efficiency and economy of their maintenance and the preparation of maintenance of way standards. The signal engineer has charge of the design, standards, methods and practices of the signal department, of new construction and inspection service required for adherence to standards.

CHARLES STERLING

CHARLES STERLING, division engineer maintenance of way of Harlem River, N. Y., has been appointed engineer of lines West with headquarters at New Haven, Conn., in connection with the general reorganization plan. Mr. Sterling entered the service of the New Haven in 1893 after graduating from Sheffield Scientific School, Yale University, in 1892. He served as transitman and assistant engineer until 1902 when he left the services of the New Haven to become construction engineer of the American Tube & Stamping Company. In 1904 he again returned to the New Haven in the capacity of transitman. He was appointed assistant division engineer in 1906 and has since served as division engineer on the Western division and also on the New York division.

W. D. WARREN, division engineer maintenance of way at Providence, R. I., has been appointed engineer of lines East with office at Boston, Mass. Mr. Warren began his railroad work as a chainman and rodman for the Boston & Maine and later served on the Pennsylvania Railroad, going to the New Haven as transitman in 1903. He was later employed by the New York Central as chief of party and with the Florida East Coast as resident engineer, returning to the New Haven in 1907 as division engineer of valuation, later becoming division engineer of the Providence division, which position he held at the time of his recent appointment.

TRACK

F. C. HANNEMAN, division roadmaster of the Spokane division of the Great Northern, with headquarters at Spokane, Wash., who was granted a leave of absence on account of sickness some time ago, has resumed his regular duties.

JOHN MCDOUGALL has been appointed assistant roadmaster on the Montana division of the Northern Pacific, with headquarters at Laurel, Mont.

CHRIS RASMUSSEN has been appointed acting roadmaster, with headquarters at Little Falls, Minn., succeeding Austin Grimes, granted leave of absence.

H. A. HALVERSON, roadmaster of the Chicago & North Western at Eagle Grove, Ia., has been transferred to Chicago, Ill., succeeding A. L. Clapp, promoted to trainmaster, as noted elsewhere. Charles Kratoska, foreman of bridges and buildings at Belle Plaine, Ia., has been appointed roadmaster at Eagle Grove, succeeding H. A. Halverson, transferred.

R. G. KNIGHT, roadmaster of the Northern Pacific at Staples, Minn., has been transferred to the Tacoma division, with headquarters at Tacoma, Wash., succeeding A. A. McCree, resigned to engage in other service. Hans Olson, assistant roadmaster, has been appointed roadmaster at Staples, succeeding R. G. Knight, transferred. G. W. De Lambert has been appointed assistant roadmaster, succeeding Hans Olson, promoted.

C. E. DOUBLE, section foreman on the Chicago, Burlington & Quincy, at Ottumwa, Iowa, has been promoted to roadmaster of the Burlington division, with headquarters at Burlington, Ia., succeeding H. Tabbert, who has been transferred to the St. Joseph division, with headquarters at Council Bluffs, Ia., in place of J. S. Miller, appointed roadmaster and assistant trainmaster on the Aurora division, at Aurora, Ill., succeeding R. C. Violet resigned.

BRIDGE

GUNNER TORNES has been appointed acting chief carpenter of the Chicago, Milwaukee & St. Paul, with headquarters at Dubuque, Ia., succeeding P. A. Cameron, assigned to other duties.

B. S. FRANCIS, assistant superintendent of bridges and buildings of the New York Central, at Jersey Shore, Pa., has been appointed supervisor of bridges and buildings at Rochester, N. Y.

ERNEST COLCLOUGH has been appointed general foreman of the bridge and building and water service department on the Valley division of the Atchison, Topeka & Santa Fe, with headquarters at Fresno, Cal., succeeding J. W. Wood, transferred to San Bernardino, Cal., in place of J. F. Parker, who has retired from the service.

VICTOR M. HANSEN, whose appointment as chief carpenter on the Iowa and Dakota division of the Chicago, Milwaukee & St. Paul, with headquarters at Mason City, Ia., has already been mentioned in these columns, was born on November 10, 1885, at Nye, Wis. He began railway work in August, 1908, as a carpenter in the bridge and building department on the Hastings and Dakota division of the Chicago, Milwaukee & St. Paul, and in 1914 was transferred to the Iowa and Dakota division as pump repairer foreman, which position he held until his recent appointment, as noted above.

PETER VANDANACKER, announcement of whose appointment as chief carpenter of the east end of the Hastings and Dakota division of the Chicago, Milwaukee & St. Paul, with headquarters at Minneapolis, Minn., was made in these columns last month, was born in Jackson County, Iowa, June 19, 1869. After receiving a common school education, he entered railway service as a carpenter in June, 1887, with the Chicago, Milwaukee & St. Paul at North McGregor, Ia. He served in this capacity for about 20 years, being engaged during this time at various points along the line in the construction of new buildings and other work in this department. Five years ago he was assigned to the masonry department, which connection he held at the time of his present appointment, as noted above. He succeeds W. H. MacArthur, resigned.

PURCHASING

WILLIAM S. MOREHEAD has been appointed assistant general storekeeper of the Illinois Central, with office at Chicago, Ill., succeeding William Davidson, promoted. He will have jurisdiction over the northern lines.

W. A. SUMMERHAYS, general storekeeper of the Illinois Central, with headquarters at Chicago, has been appointed assistant purchasing agent, with the same headquarters. He was educated in the University of Illinois. He entered the service of the Illinois Central in June, 1898, as an engineering apprentice assigned to track work, and in 1900 he became section foreman.

The following year he became successively general foreman of construction and assistant general storekeeper. In May, 1910, he was appointed general storekeeper, which position he held until his recent appointment.

WILLIAM DAVIDSON has been appointed general storekeeper of the Illinois Central, with office at Burnside (Chicago). He entered railway service in 1893 with the Yazoo & Mississippi Valley. In May, 1910, he was appointed assistant general storekeeper of the Illinois Central and the Yazoo & Mississippi Valley, which position he held until his recent promotion.

ERNEST BAXTER, who has been appointed general storekeeper of the Wabash, with office at St. Louis, Mo., entered rail service with the Michigan Central in March, 1903, and served in various capacities with a number of railroads. In March, 1917, he became service inspector for the Wabash at St. Louis, which position he held at the time of his appointment, as noted above.

THOMAS H. RYAN has been appointed purchasing agent of the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with office at New Orleans, La. He entered the service of these roads in July, 1903, and in May, 1917, he was made chief clerk in the purchasing department, which position he held until his appointment as noted above. He succeeds W. D. Kelliher, who has resigned to enter other business.

IN MILITARY SERVICE

CHARLES W. BREED, office engineer of the Chicago, Burlington & Quincy, at Chicago, has been appointed captain in the Engineer Officers' Reserve Corps of the United States Army.

W. G. ARN, assistant engineer maintenance of way of the Illinois Central, with office at Chicago, has been appointed captain adjutant, Engineer Officers' Reserve Corps of the United States Army.

WHITNEY J. RIDER, assistant engineer of the Ft. Smith & Western, Ft. Smith, Ark., has been granted a leave of absence for the purpose of entering the officers' training camp at Fort Logan H. Root, Little Rock, Ark.

M. S. STEVENS, assistant engineer maintenance of way of the Toledo, Peoria & Western, with headquarters at Peoria, Ill., left railway service on May 10 to enter the officers' training camp, infantry division, at Fort Sheridan, Ill.

E. A. FROYD, engineer maintenance of way of the Chicago, Peoria & St. Louis, Springfield, Ill., received a commission as captain of infantry on April 16, and was ordered to service at Fort Benjamin Harrison, Ind., on May 8.

R. M. MILAM, division engineer of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., has been appointed a captain in the National Guard, State of Tennessee, First Tennessee Infantry, and is now at the mobilization camp at Belle Meade (Camp Andrew Jackson).

JENKS B. JENKINS, valuation engineer of the Baltimore & Ohio, has received a commission as major in the engineering division of the United States Army and expects to receive orders to go to France in the near future. Nineteen assistant engineers and other employees in the valuation department of that road have applied for commissions in the engineering branch of the service or have enlisted in the army and navy since the call for troops was made.

OBITUARY

WILLIAM HOOPER SHELDON, formerly principal assistant engineer of the Chicago, Milwaukee & St. Paul, died at Milwaukee on May 3, at the age of 87 years. He was born in Gardiner, Me., in March, 1830. He entered railway service in the engineering department of the Northern Pacific in 1866 and located many miles of lines for that company. In 1869 he accepted a position with the Chicago, Milwaukee & St. Paul and remained in the service of this road continuously until he retired a few years ago. While with this company he located and built many miles of lines now included in this system. Among other projects he was in charge of the construction of bridges crossing the Mississippi River at La Crosse, Wis., and Sabula, Iowa. He also built the tunnel on the Chicago-Minneapolis main line of this road at Tunnel City, Wis. For many years preceding his retirement he was principal assistant engineer of the St. Paul.

CONSTRUCTION NEWS

THE CHICAGO UNION STATION COMPANY has awarded a contract to the W. J. Newman Company, Chicago, to wreck and remove all buildings and obstructions in the block bounded by Adams, Canal, Clinton streets and Jackson boulevard, which is the site of the head house of the new station. This work must be completed by September 2, 1917.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS has authorized the construction of a new freight house at Middletown, Ohio, which will cost about $30,000. The structure will be of brick and concrete construction, 40 ft. wide and 260 ft. long.

THE CUMBERLAND VALLEY has awarded a contract to Mason & Hanger Company, Lexington, Ky., for grading work, involving the handling of 100,000 cu. yd. of earth on an extension of double track from Oakville, Pa., to the eastern limits of Shippensburg, Pa., a distance of 6 miles, and also for the extension of second track 1.3 miles into Hagerstown, Md., involving the moving of 35,000 cu. yd. of materials.

THE EL PASO & SOUTHWESTERN proposes to construct a freight terminal building at El Paso, Tex. It will be a one-story brick structure, 160 ft. by 990 ft., with concrete foundation, and will cost about $250,000. The building will be subdivided to provide for inbound and outbound freight houses and several offices. Contracts will be let soon.

THE GREAT NORTHERN has awarded a contract to Brown, Leahy & Fraser to grade a new receiving and classification yard at Great Falls, Mont. Fifteen miles of new track will be laid in connection with the work. The yard at Wolf Point, Mont., will also require considerable grading and new rail. Contracts for new buildings at this point were let to W. F. Hill, Superior, Wis. The cost of these and some miscellaneous improvements in this vicinity are estimated at $300,000.

THE HUDSON RIVER CONNECTING RAILROAD, a subsidiary of the New York Central, has had its application approved by the Secretary of War, for permission to build a bridge over the Hudson River about 11 miles south of Albany, N. Y., and 1.8 miles south of Castleton. It is to have a combination steel truss and plate girder superstructure, carried on steel and concrete piers and will have two spans, one of 600 ft. and the other of 405 ft., with a vertical clearance of 139 ft. at the center of the spans. Work is to be started at once, and pushed to early completion.

THE ILLINOIS CENTRAL has awarded a contract to Philbrick & Baxter, Jackson, Miss., for grading about 23 miles of second main track at two points on the Yazoo & Mississippi Valley. One stretch comprises about 12 miles between Marienette, Miss., and Pritchard, and the other about 11 miles between Gwin and Cruger. The total cost, including bridges, new rail and other essentials will reach $500,000.

This road has awarded a contract to the Railroad Water & Coal Handling Company, Chicago, Ill., for the installation of pipe lines, hydrants, penstocks and other auxiliaries for the water supply for its new engine terminal at Baton Rouge, La. The estimated cost of these improvements is $15,000.

This road is contemplating the construction of a large hump yard and engine terminal facilities near Harvey (Chicago), Ill., which will serve as a division terminal for all freight traffic from the South, except fruit and vegetable trains, which will continue to go direct to South Water street, Chicago. This yard will relieve the facilities now existing at Burnside, Fordham and Riverdale.

This road also plans extensive improvements in its mechanical terminal at Clinton, Ill., to cost approximately $250,000. The work will include the extension of the 23-stall roundhouse, new engine pits, a power house, with concrete coal bunkers and a reinforced concrete chimney; a 500-ton reinforced concrete coal chute; a brick sand drying house and a standard wet sand bin.

THE KANSAS CITY, MEXICO & ORIENT will begin work on the construction of the proposed branch line from San Angelo, Tex., to Del Rio, about 120 miles. Grading has already been finished and track laying will commence as soon as permission is obtained from the state of Texas. The Mexican government plans to resume construction of the branch line of the National Rail-

ways of Mexico from Allende, Mex., to Las Vacas, opposite Del Rio, at any early date. The Kansas City, Mexico & Orient and the National Railways of Mexico jointly will build a bridge across the Rio Grande which will form a new rail gateway between the United States and Mexico.

THE LEHIGH & NEW ENGLAND is making surveys for a branch line from Bethlehem, Pa., west to Allentown and on to Catasauqua, a distance of eight miles, and plans to start work early in the summer. There will be several undergrade or overhead crossings of public highways.

A NEW ROAD IN TEXAS, which is practically an extension of the Trinity & Brazos Valley, the officers being the same for both roads, is to be built from Dayton, Tex., through Mt. Bellview and into the Goose Creek oil fields, a distance of about 23 miles. The grading will average 7,500 cu. yd. to the mile; the maximum grade will be 0.3 per cent and the maximum curve 2 deg. Thirty wooden bridges will be constructed and a depot and other terminal facilities will be built at Goose Creek.

THE NEW YORK CENTRAL has awarded a contract to John W. Cowper & Co., Buffalo, N. Y., for the construction of an engine house, with turntable and annex buildings, at Gardenville, N. Y., to cost approximately $150,000.

THE PENNSYLVANIA RAILROAD has awarded a contract to Geo. W. Rockwell, of Sunbury, Pa., for the masonry work in connection with the rebuilding of a four-span, pin-connected through truss bridge over the Juniata River at Lewistown, Pa. This is to be accomplished by placing intermediate piers and shortening the spans. The cost of the improvement will be about $135,000.

This road has authorized the construction of a small engine house, turntable, coal and water station, etc., for handling engines, also for a small car repair yard at Wheatland, Pa., at a cost of about $92,000.

THE OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY has awarded a contract to the Grant Smith Company, Portland, Ore., to fill three long trestles near Weston, Ore., on the Pendelton-Walla Walla division. The contract price is $110,000.

THE SALT LAKE & UTAH has awarded contracts for a new line from Hunter, Utah, which is about six miles south of Salt Lake City, to Pleasant Green, a distance of about nine miles. Work has been started and it is hoped to complete it before next winter. The cost is between $300,000 and $400,000.

THE SOUTHERN plans to construct a building at Alexandria, Va., for the use of the test department. It will be a reinforced concrete structure 47 ft. by 80 ft., with brick curtain walls, and will be two stories high, with a basement.

This road will commence work at once on the construction of 26.2 miles of double track on the Cincinnati-Chattanooga line. Contracts have been let for the grading to the following contractors: Between Lancing, Tenn., and Huffman, 11.1 miles, to H. H. Thrasher, Knoxville, Tenn.; between Robbins, Tenn., and Helenwood, 6.4 miles, to the Shehan Construction Corporation, Roanoke, Va.; between Moreland, Ky., and South Fork, 8.7 miles, to the Mann Construction Company, Knoxville. Between Huffman and Lancing tunnel No. 17, 1,250 ft. long, will be eliminated.

THE VIRGINIAN has let contracts to the Wellman-Seaver-Morgan Company, the Virginia Bridge & Iron Company and J. P. Pettyjohn & Co. for concrete and steel work and machinery in connection with provision for additional dumping facilities for the coal pier at Norfolk, Va. The cost of the work will be about $673,000.

THE WESTERN PACIFIC, which recently took over the operation of the Nevada, California & Oregon, will expend about $450,000 in improving the line from Reno, Nev., to Chilcoot, Cal., the work to be done by company forces.

TRACK MATERIALS

THE LOUISVILLE & NASHVILLE recently purchased 25,000 kegs of track spikes.

THE UNION PACIFIC has placed an order with the Illinois Steel Company for 30,000 tons of rails for delivery in the last quarter of 1918.

STRUCTURAL STEEL

THE CHICAGO UNION STATION COMPANY has ordered 3,090 tons of steel from the American Bridge Company for viaducts at Polk and Taylor streets, Chicago, Ill.

SUPPLY TRADE NEWS

PERSONAL

RICHARD A. VAN HOUTEN, for the past four years sales agent of the Sellers Manufacturing Company, Chicago, has been appointed manager of the plant at Mayfair (Chicago, Ill.), where he will have complete charge of the manufacturing operations.

J. W. DEETRICK, who for several years has been general manager of the Republic Iron & Steel Company, Youngstown, Ohio, has been elected a director of this company and second vice-president in charge of operation. While the title of general manager has been abolished, Mr. Deetrick will still continue to supervise operations at all of the plants.

E. L. RUBY, who for the past year has been eastern representative of the Hayes Track Appliance Company, Richmond, Ind., has opened an office in the Real Estate Trust building, Philadelphia, Pa., where he will not only handle the sale of the Hayes derails in the eastern territory, but also the Keystone tool grinder manufactured by the Keystone Grinder & Manufacturing Company, Pittsburgh, Pa.

HARRY C. QUEST, who for a number of years has been a representative of paint and varnish companies in the railway supply field, has associated himself with A. A. Ridgway under the firm name of Ridgway-Quest Company, Chicago, to manufacture paints and varnishes for use in the railway field. Mr. Quest is president of this company. He began his career in the railway supply business in 1901 with the Heath & Milligan Company, Chicago, and since then has been engaged in the sale of paints and varnishes to the railways, car companies and allied industries. The new plant of the Ridgway-Quest Company has been especially equipped for the production of these materials for the railway field. Branch offices will later be established in New York City and Denver, Colo., although Mr. Quest will cover all parts of the United States himself.

H. C. QUEST

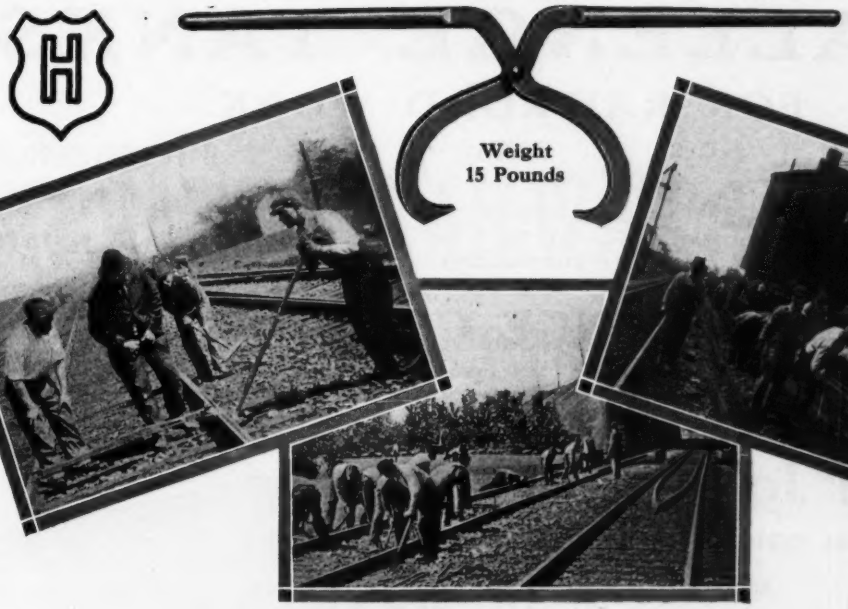
GENERAL

THE RAILWAY ELECTRIC SWITCH & SUPPLY COMPANY, Pittsburgh, Pa., has been incorporated under the laws of Delaware with a capital stock of $1,500,000. The company will manufacture railway switches and allied products.

THE INDEPENDENT PNEUMATIC TOOL COMPANY, Chicago, held a special meeting on May 3 to elect a successor to its late president, James Buchanan Brady. The former vice-president, John D. Hurley, was elected president. R. S. Cooper, manager of the New York office of this company, was elected vice-president, succeeding Mr. Hurley, and Robert T. Scott, manager of the company's Pittsburgh office, was elected a director and member of the executive committee.

HUBBARD & Co., Pittsburgh, Pa., manufacturers of shovels, spades, scoops, railway track tools and other steel specialties, has purchased the plant of Beall Bros., Alton, Ill., shovel manufacturers, as well as the Jackson Shovel and Tool Company, Montpelier, Ind. In the future these two plants will be operated as branches of the Pittsburgh factory under the former titles of Beall Bros. and the Jackson Shovel & Tool Company. Hubbard & Co. has also acquired control of the Ohio Shovel & Stamping Company, Canal Dover, Ohio, and the shovel works of the Husey-Binns Company, Charleroi, Pa.

Tie Tongs



HUBBARD

Track Tools and Shovels

Tamping Bar

Since 1843, the "Hubbard" trade mark on track tools and and shovels has been the means of identifying a superior product—a product that measures up to the railway men's standard of service.

Back of the "Hubbard" trade mark is a reputation for integrity and the Hubbard guarantee:

All tools manufactured by us are guaranteed to be perfect in workmanship and material; if any prove defective in any way, prompt replacement will be made without charge.

Write for Prints and Catalogs

Plain Back Spade

Hubbard & Company

PITTSBURGH, PENNA.

CHALLENGE TANKS

FOR RAILROAD WORK

FIR OR CYPRESS FOR DURABILITY

FLAT, ROUND, HALF OVAL OR HALF ROUND HOOPS

BUILT TO YOUR ORDER

FOR RECONSTRUCTING TANKS A SPECIALTY

HAVE PROVED TO GIVE THE LOWEST FINAL COST

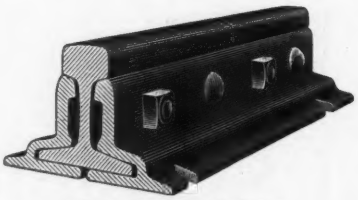
CHALLENGE COMPANY

Address Railroad Department BATAVIA, ILL.

The Rail Joint Co.

GENERAL OFFICES:

61 Broadway New York City



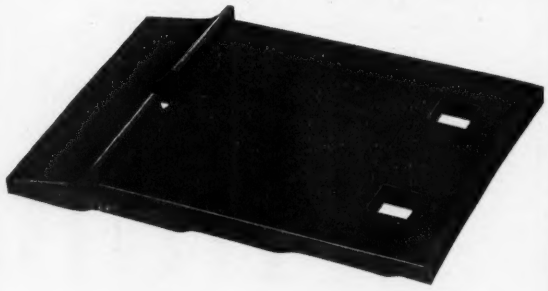
Continuous Rail Joint

Makers of Continuous, Weber, Wolhaupter and 100% rail joints.

Standard—Insulated—Step—Frog and Switch Types.

Grand Prize San Francisco 1915

Protected by Patents



One of the most distinguished, successful and honored Engineers of the United States, while not wishing his name to appear in an advertisement, writes as follows of The

LUNDIE TIE PLATE

"It is by far the most scientifically designed and practically efficient tie plate ever evolved."

JOHN LUNDIE, 52 Broadway, NEW YORK

Capacity, 60,000 gallons. Height, 36 ft. 8 in. to top.

STEEL RAILWAY SERVICE TANKS

FOR

PERMANENCE AND NEGLIGIBLE MAINTENANCE COST

WRITE FOR RAILWAY BOOKLET NO. 28

We manufacture and erect Elevated Steel Tanks and Standpipes for every service

Pittsburgh-Des Moines Steel Co.

Pittsburgh, Pa., 920 Curry Building. New York City, 55 Church St. San Francisco, Cal., 5000 Rialto Building. Chicago, Ill., 1290 First National Bank Bldg. Havana, Cuba, Room 165 Nova Scotia Bank Building. Dallas, Texas, 1285 Praetorian Building

Des Moines Bridge & Iron Co.

Des Moines, Iowa, 912 Tuttle St.

TREATING RAILWAY TIMBERS

TO OBTAIN THE FULL MECHANICAL LIFE

The preservative must be pure, stable, of deep penetrance, insoluble in water and unaffected by extremes in temperature

TO ACCOMPLISH THIS

Reilly Improved Creosote Oil

IS THE ONE SURE WAY

We urge you to investigate and advise us of your requirements

WE ALSO MANUFACTURE

Maintenance of Way Oil No. 1

Maintenance of Way Oil No. 2

Maintenance of Way Oil No. 3

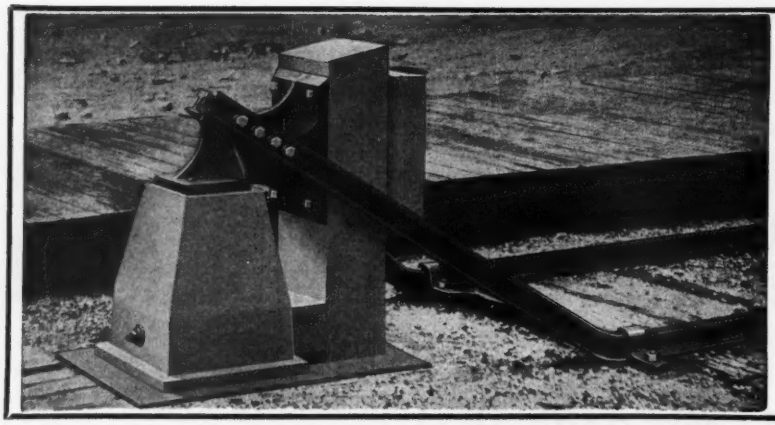
REPUBLIC CREOSOTING COMPANY

1614 Merchants Bank Building

Indianapolis, Indiana

PLANTS

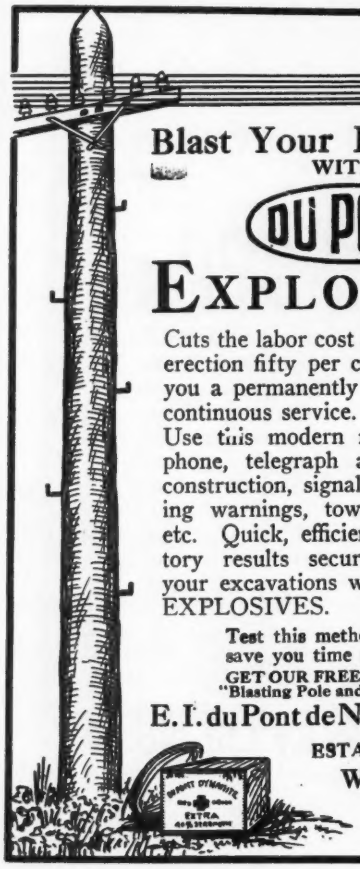
Indianapolis **Minneapolis** **Mobile** **Seattle**



ELLIS
PATENT
Bumping Post

Simple, Strong and Lasting
Adapted to All Positions

Mechanical Manufacturing Co.
Chicago, Ill.

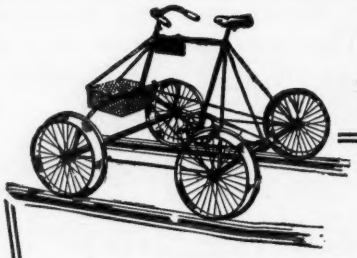


Blast Your Pole Holes
WITH
DU PONT
EXPLOSIVES

Cuts the labor cost of pole and post erection fifty per cent, and insures you a permanently secure line and continuous service.
Use this modern method in telephone, telegraph and power line construction, signal systems, crossing warnings, tower foundations, etc. Quick, efficient and satisfactory results secured by blasting your excavations with DU PONT EXPLOSIVES.

Test this method. It will save you time and money.
GET OUR FREE BOOKLET; "Blasting Pole and Post Holes."

E. I. du Pont de Nemours & Co.
ESTABLISHED 1802
Wilmington, Delaware



Why Repeat

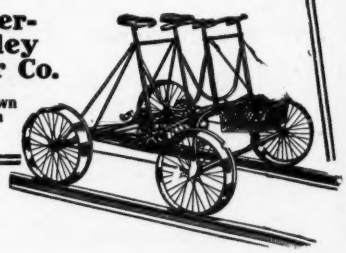
Why repeat that which is a well-known fact to railroad men, the men who buy and the men who use

Inspection Cars

Hartley & Teeter Light Inspection Cars are the strongest and lightest known. Why repeat that fact when a constant stream of repeat orders proves it constantly.

Such is the fact—the reason—ask the men who use them or send for our new catalogue.

Teeter-Hartley Motor Co.
Hagerstown Indiana

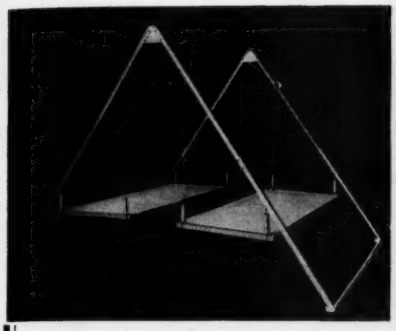


FROGS — SWITCHES — STANDS

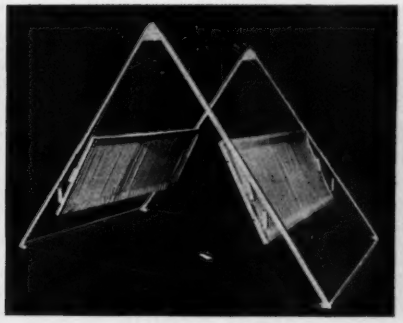
Manganese and Built-Up Construction

IN STOCK for IMMEDIATE SHIPMENT

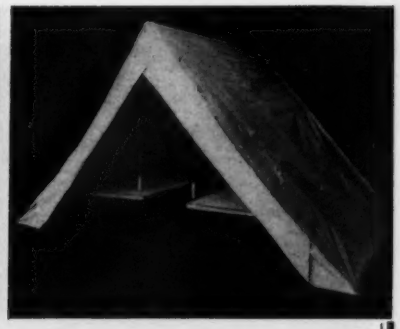
THE INDIANAPOLIS SWITCH & FROG COMPANY
NEW YORK SPRINGFIELD, OHIO CHICAGO



Frame ready for tent.



Beds folded up.



Ready for use.

Keep Your Cars in Service—Use Gosso Tents

At this time every car fit for service should be earning revenue. The shortage of cars and their present value in service make the use of cars for housing laborers a very expensive proposition—aside from the expense of fitting them with bunks.

Substitute Gosso Camp Outfits. With these tents, camps can be made anywhere along the right of way without spurring out cars. The Gosso camp outfit folds compactly into a box 10"x12"x4'9" long; easily loaded and unloaded; can be set up ready for use in a few minutes by the men on their own time.

Aside from being more sanitary and more economical than bunk cars, Gosso tents are *more comfortable.* They keep the men better satisfied, which means greater efficiency.

A Gosso outfit will last for years without maintenance expense. The first cost is the only cost, and that is reasonable.

Try Gosso Tents and You Will Know Their Advantages

The Gosso Co., 14 E. Jackson Blvd., Chicago

SHERWIN-WILLIAMS

CARBOLIC-OL

WOOD PRESERVATIVE
A PURE COAL-TAR OIL

For Brush Treatment of Bridge Timbers, Poles, Ties, Cross-Arms, Pins, Platforms, Etc.

THE SHERWIN-WILLIAMS CO.

Paint and Varnish Makers

Address Inquiries to

601 Canal Road, N. W. CLEVELAND, OHIO

Low Maintenance Cost

easy installation and longer service *dictate* the use of

STEWART IRON FENCE
"The Standard of the World"

for all work at stations or within switching limits for intertrack fence, right-of-way fence, iron and wire window-guards, baggage-room and concourse enclosures.

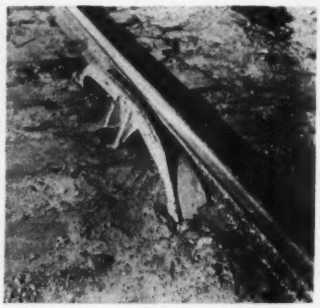
Stewart fence and gates are built to meet your particular problem in handling crowds, protecting property and preventing damage suits.

Scientifically designed. Last a lifetime.

Experience records of leading roads prove Stewart fence the cheapest and best protection in the long run. Write for catalog. State your problem and get the facts to-day.

THE STEWART IRON WORKS COMPANY, Inc.
700 Stewart Block Cincinnati, Ohio

"The World's Greatest Iron Fence Builders"



GUARD RAILS

Something New and Different

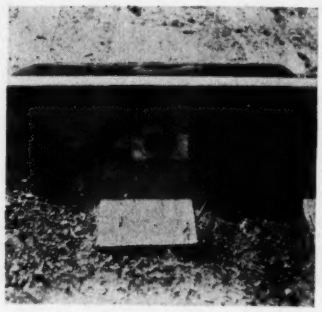
The results are just as attractive as the appearance

Save $8.00 per Turnout. Write for catalog

National Steel Products Co., Inc.

Formerly Bohannan Easer Joint Co.

ENSLEY ALABAMA

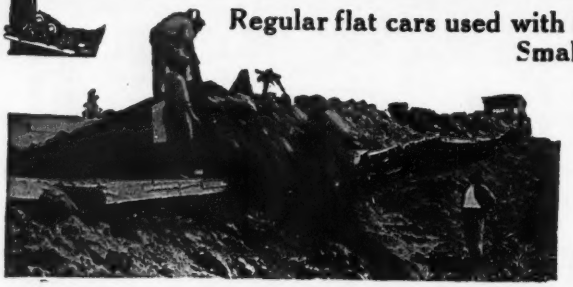


Note the foot guard and the wearing insert. Weight 80 lbs.

Note the key locked with a spike and the length of guard rail

LIDGERWOOD RAPID UNLOADER

Regular flat cars used with this method, reducing dead weight haulage. Smaller crews required.



Load can all be dumped in one place.
Load can be spread along any distance.
Cars unloaded at lowest cost.

Send for Bulletin

HOISTS FOR EVERY RAILROAD SERVICE

Lidgerwood Mfg. Co. 96 Liberty Street **New York**

Philadelphia Pittsburgh Chicago Los Angeles Seattle

Steel for Service

23 Carloads—1250 Net Tons

This represents the final shipment of 12½ in., 43 lb.

United States Steel Sheet Piling

for use in the construction of a dock at Steelton, Minn., by the Duluth, Missabe & Northern Railway.

The complete order called for 4525 pieces 38 ft. long, amounting to 3697 net tons.

Twelve years ago when the first United States Steel Sheet Piling was rolled, the annual consumption of Steel Sheet Piling in the United States was negligible. Today it is a well-recognized standard article of commerce indispensable in foundation work.

The Carnegie Steel Company has played a very large part in this development. Its engineers have had experience in all classes of sheet piling installations and are at the service of users.

The Carnegie pamphlet, Steel Sheet Piling, tenth edition, contains information of high value and should be in the hands of every engineer and contractor specializing in foundation work.

Carnegie Steel Company

General Offices—Pittsburgh, Pa.

872

Which Condition Would Attract the More Efficient Help?

The growing scarcity of track labor—especially good help—is one of the biggest problems confronting railroads. The bigger and more progressive roads are going a long way toward solving the problem by providing attractive living quarters for section and construction gangs. Instead of ill-ventilated box cars fitted with vermin-infested wooden bunks, they use reconstructed coaches—airy and well lighted—fitted with

Romelink All-Metal Work Bunks

The cleanly comfortable surroundings exert a distinctly good influence on the men—make for greater efficiency and solid contentment.

Romelink Bunks are made with solid steel, hand-riveted frames—nothing to break, nothing to work loose under hard usage. The patent *sagless springs* are galvanized and will not rust. There are no corners or crevices to collect dirt or harbor vermin. Comfortable, sanitary, fireproof, portable and indesructible—Romelink Bunks are the best investment for welfare and efficiency you could possibly make. Ask for full details.

Southern-Rome Co.

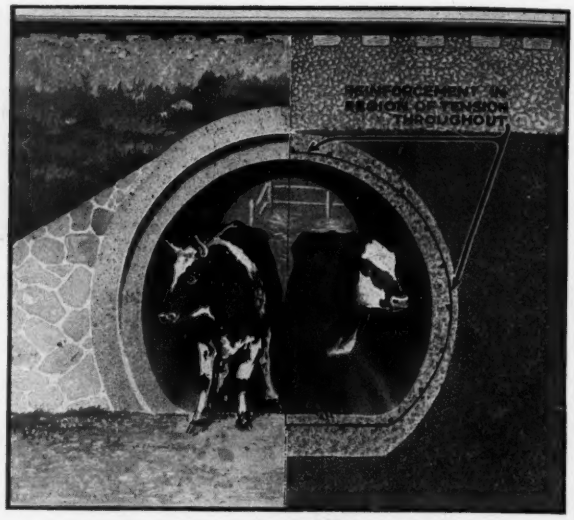
617-623 West Pratt Street
Baltimore, Md.

Massey Concrete Cattle Pass

Here's a point of superiority you engineers will recognize—only in the Massey cattle pass is the reinforcing placed in the region of tension throughout. The cross-section illustrates this big advantage. The strength it adds should be considered when you are contemplating the installation of cattle passes.

The Massey cattle pass is made up at our factories in units 6' long, 84" wide by 72" high inside. Two head of cattle pass through side by side. A flat bottom gives them broader footing.

The Massey pass is built to carry the dead load in deep fills, and live loads when placed within about 3' of the base of the rail. It is more economical than any other type of structure, and requires absolutely no maintenance.



Massey factories make concrete culvert pipe, 12" to 84" in diameter, concrete bridge slabs, piles, and portable concrete houses. Our plant locations and large stock of standard products enable us to make prompt deliveries at low freight rates.

Get Massey Service with Your Cattle Pass

C. F. MASSEY COMPANY

NEW YORK NORFOLK — KANSAS CITY — Peoples Gas Building CHICAGO — MINNEAPOLIS — SPOKANE DALLAS

Factories Located at

Newark, N. J. Chicago, Ill. — Memphis, Tenn. Anna, Ill. — Kansas City, Mo. Meridian, Miss. — Minneapolis, Minn. Spokane, Wash. — Dallas, Tex. Chatham, Ont., Can.

The Sign of Superiority

on Black and Galvanized Sheets and Terne Plates.

KEYSTONE COPPER STEEL

The added durability and service of these products has been fully substantiated by the most exacting service tests, also by actual experience of buyers and users. We unhesitatingly recommend *Keystone* quality as superior to any other products on the market. Demand *Apollo-Keystone Galvanized for Culverts, Flumes, Etc.*

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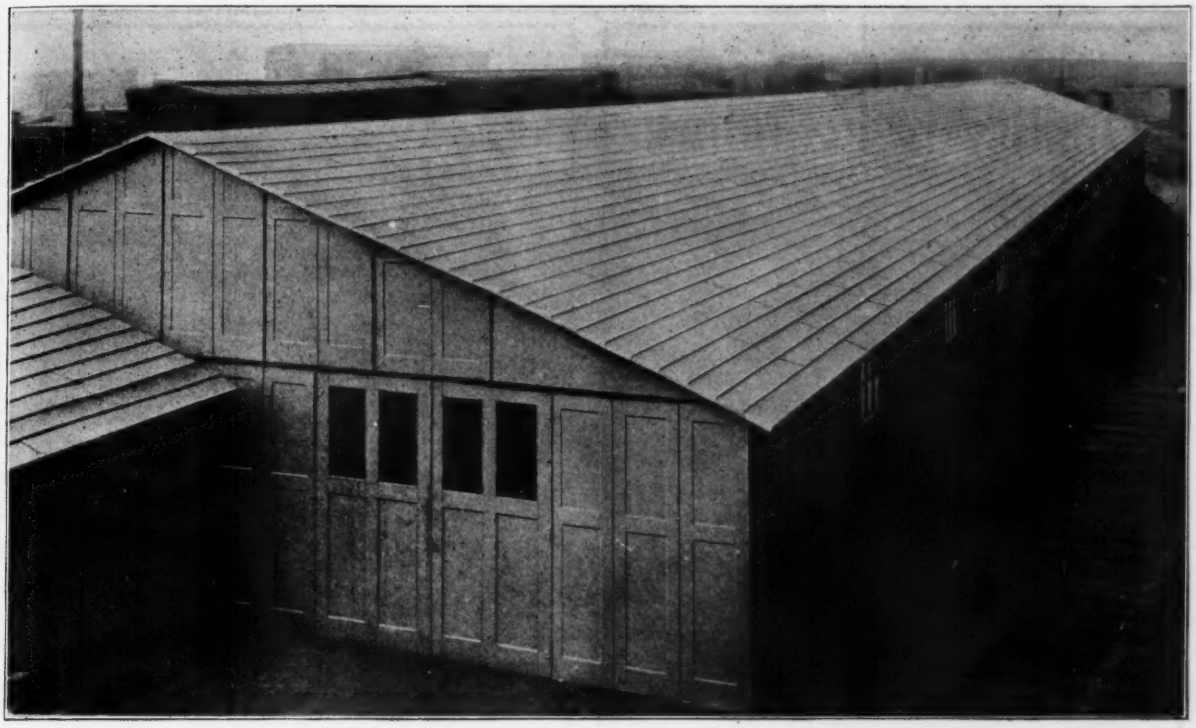
Pacific Coast Representatives: UNITED STATES STEEL PRODUCTS COMPANY, San Francisco, Los Angeles, Portland, Seattle



The Ever-Ready Truscon STEEL BUILDINGS

PORTABLE PERMANENT

"Preparedness" might well be the slogan of the Truscon Steel Buildings. In railroad maintenance work it is a time-saving aid to know that every operation short of actual erection in the field has been anticipated and performed by the makers. Structural members are ready for instant use.

Simplicity and thoroughness mark assembling methods. The sectional unit panels are interchangeable; any desired plan of wall, windows and doors and any requirement as to size may be met.

One form of slotted bolt and wedge makes all connections; a hammer is the only tool required.

Its purpose served, the Truscon Steel Building can be taken down easily and re-erected without loss of strength or appearance.

The Truscon Steel Building meets thoroughly and satisfactorily the most urgent need of buildings in railroad work. Send for our book on Railroad Structures.

Weathertight Joint between Panels and Mullion.

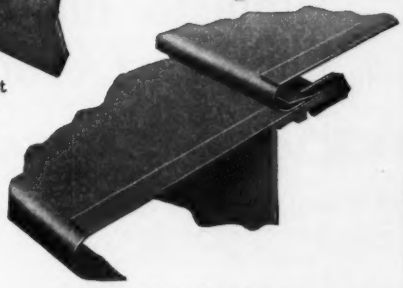
Trussed Concrete Steel Company

KAHN Building Products

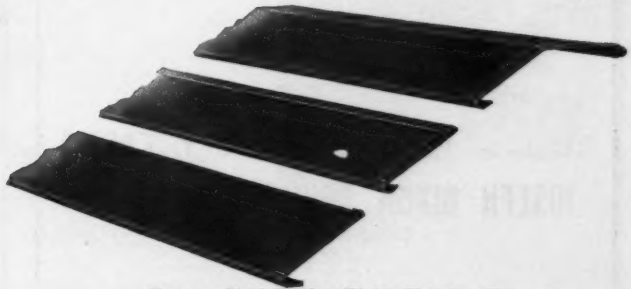
Representatives in Principal Cities

Railroad Department Youngstown, Ohio

KAHN Building Products



Weathertight Joint at Eaves.



Truscon Steel Roofing Plates Showing Eave, Intermediate and Ridge Plates.

Quality Is Economy

Railroad Managers and Engineers Specify

DIXON'S SILICA-GRAPHITE PAINT

because it shows the lowest yearly cost when you divide the many years of paint service into the FIRST COST. We have made this paint for over fifty years in FIRST QUALITY only. This is a guarantee of best service, best quality and highest paint economy.

Dixon's Silica-Graphite Paint affords the most tenacious and resistant film known.

In specifying Dixon's Paint you will not be disappointed. Records tell of services of eight to fifteen years on railroad bridges. It is used by leading railroads all over the world.

If interested, write us for full particulars and Booklet 187 B.

Made in JERSEY CITY, N. J., by the

JOSEPH DIXON CRUCIBLE COMPANY

Established 1827

Our Guarantee To Advertisers

Five of our papers—Railway Age Gazette (weekly), Railway Electrical Engineer (monthly), Railway Mechanical Engineer (monthly), Railway Signal Engineer (monthly), and the Railway Maintenance Engineer (monthly) are members of the Audit Bureau of Circulations.

As the Audit Bureau of Circulations is composed of advertisers, advertising agents, and publishers with control in the hands of advertiser members; and as all publications which are admitted must first undergo a thorough investigation as to their circulation methods and then submit to an annual audit of their subscription books and records, it is clear that everything we say about circulation is susceptible of independent verification.

In each issue of our five publications we print a statement showing the total number of copies printed and how distributed. Then we take a long step forward by making it a part of all contracts for advertising, by including therein a clause which says that the publisher **"guarantees and hereby makes a part of this order the statements of its circulation regularly printed in the paper."**

Do you know of anything more convincing?

Simmons-Boardman Publishing Company

New York **Chicago**
Cleveland **Washington**

All five papers are also members of the Associated Business Papers (A B P)

How The Cement-Gun Solved A Difficult Problem For The Atlantic City & Shore Railroad

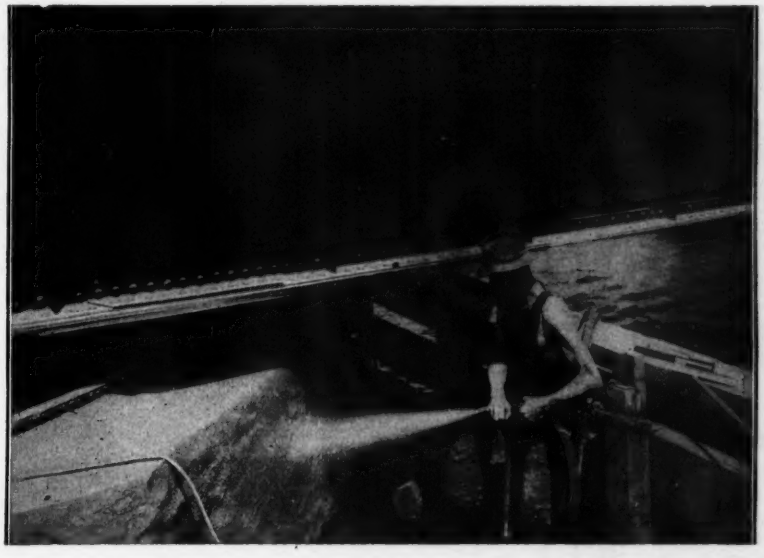
The Problem

The pivot pier of the A. C. & S. R. R. bridge across the inlet at Atlantic City had been eaten away by the fast-running tide to a depth of 14 to 17 inches.

It resolved into this—tear down the old pier at great expense and put the railroad practically out of commission during the time of the construction of the new pier or find some means to repair the old pier.

Such was the problem which confronted the A. C. & S. R. R., such the problem solved for them by means of the

CEMENT-GUN and its product **GUNITE**



The Solution

All loose and scaly concrete was first cleaned off, and then, using the Cement-Gun as a sand-blast machine, the surface of this portion to be repaired was cleaned of all scum or foreign matter. Then by means of the Cement-Gun, Gunite was forced on in successive layers until the damaged portion, which extended entirely around the pier, was built out to its original contour.

Not only was this done without disturbing traffic and between tides; not alone were the money savings great, but there were no soft spots or horizontal lines in the "Gunite" coating, hence no chance for the tide to work into the concrete and again cut it out. In fact, it is a better, stronger pier than when it was first built.

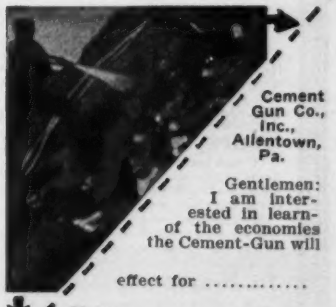
This is but one example of the general utility of a Cement-Gun for Every Division. It is merely an indication to you what this—the Field Gun of General Satisfaction—will mean for your road. The Cement-Gun is not a restricted article, nor are its services restricted to any class of work. It can be purchased outright from us by anyone, and it *should* be used by everyone who has concrete work to do.

CEMENT-GUN CO., INC.

So. 10th and Mill Streets **Allentown, Pa.**

New York Office, 30 Church Street

Byers & Ayers, 1414 Fisher Bldg., Chicago, Ill.: John A. Traylor, Newhouse Bldg., Salt Lake City, Utah: Taylor Engineering Co., 538 Central Bldg., Seattle, Wash.: Taylor Engineering Co., Vancouver, B. C.: A. R. Roberts, 727 Traders Bank Bldg., Toronto, Ont., Canada.

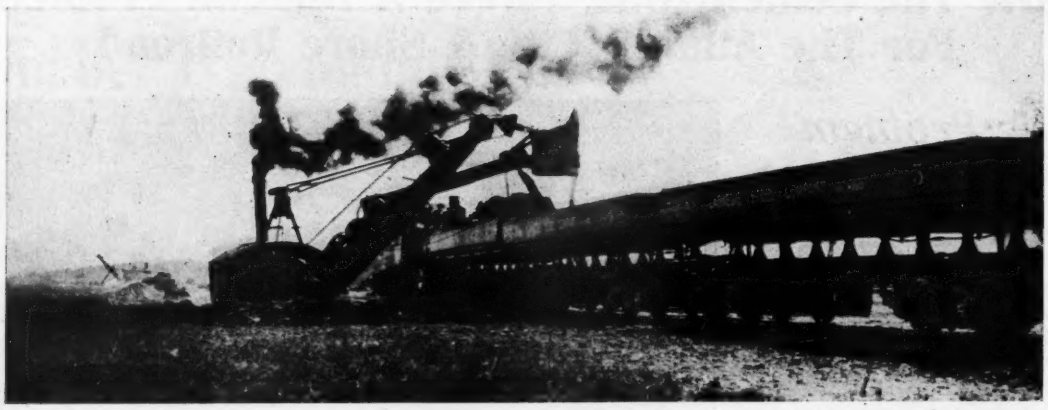


Cement Gun Co., Inc., Allentown, Pa.

Gentlemen: I am interested in learning of the economies the Cement-Gun will effect for .....

Name.....

Address.....



Western Air Dump Cars

are in use on all the Great Earth Moving Enterprises on the American Continent. Their records are well known on such jobs as the Panama Canal, the Lackawanna Cut-off, the Keokuk Dam, and scores of others of but little less importance. In all instances their performance has been the subject of much favorable comment.

Western Dump Cars have steel underframe and body frame and are built in accordance with M C B standards. They can be loaded to capacity, operated at high speed and dumped instantaneously either singly or together on straight track or curve. The only labor required for unloading is the operating of a valve in the cab by the engineer of the train.

We will gladly put you in touch with any or all of the forty-five big roads that are now using Western Air Dump Cars. Write us today.

WESTERN WHEELED SCRAPER CO., Aurora, Illinois

Marion

Steam Shovels, Dredges, Draglines and Kindred Machinery

THE Puget Sound & Cascade Railway Company, Clear Lake, Washington, use this Model 31 "Marion" for nearly everything that could be given a Shovel to do. And in the words of President B. R. Lewis, "I do not think there is a Shovel that could give better service,"—adding that this "Marion" was used for

Digging, Ballasting, Cleaning Up Slides, Picking Up Timbers, Etc.

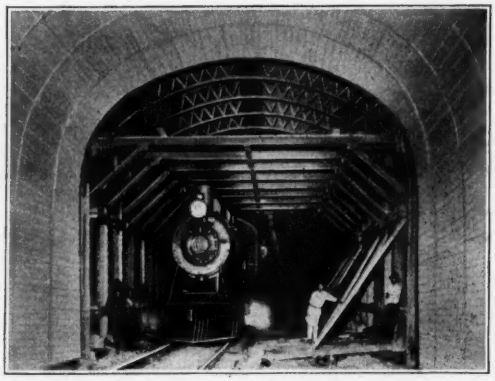
"Fifteen hundred yards of material in a single day" is one item in Mr. Lewis' report; another shows that with their "Marion" the Company cut ten miles of roadbed through hard, rocky material at one-fifth the previous cost of doing similar work by hand!

Now, Marion Shovels, Ditchers, Etc., enjoy this same good reputation with Railroads everywhere. Don't you want to get some facts on your own account? Our engineers will gladly supply them, if you will furnish the necessary particulars.

The Marion Steam Shovel Company, Marion, Ohio

Branches: Atlanta, Chicago, New York, Philadelphia, San Francisco, Seattle

228 ESTABLISHED 1884



RAPID WORK—LOWER COST BETTER RESULTS AND NO DELAY IN TRAFFIC

These are some of the advantages secured by railroads that line tunnels by the

Pneumatic Method of Mixing and Conveying Concrete
(Patented)

Labor cost and time are reduced to one-third. Less equipment is required—No other mixer, no cars, no tracks, no elevated platforms, no locomotives.

Tests of small blocks taken at random from the Wilson Avenue Tunnel, Chicago, for testing, proved not alone their exceeding density, but in many cases proved so hard that the equipment of the Underwriters' Laboratory could not crush them.

Used by C. B. & Q. and other leading roads. They secure better work at half the cost of other methods.

We lease equipment, or do work on contract.
Send for descriptive literature.

CONCRETE MIXING & PLACING CO.
123 W. Madison St. - - CHICAGO

Short Length Units—Long Length Service

Installation of National Lock-Joint Cast-Iron Culvert Pipe under a fill 40 feet high and 38 feet wide at top, on the P. R. R. System.

Forty-two inch National Lock-Joint Cast-Iron Culvert Pipe under a fill 45 feet high and 42 feet wide at the top, on the P. R. R. System.

Solves Your Culvert Renewal Problem

Savings in first cost, freight, handling, waste, overweight, combined with assured long satisfactory service, such are the factors which have caused over forty important trunk lines not only to *install,* but in many cases *standardize* on

National Lock-Joint Cast-Iron Pipe

As Permanent As Your Road Bed

The engineers of those roads have found from experience that in the "National" they have a culvert material as near ideal as possible, and secure economies, which, before its use, they did not consider possible.

Made in short lengths, 3, 4 and 5 ft., "National" pipe can be, and on these forty-odd roads is, installed by ordinary section gangs, without accessory tool of any kind, or the slightest interference with traffic.

No piles to drive, no fills to remove, no tunneling. Rethread the old culvert and back fill with concrete, that's all, *except big economies and long, satisfactory service.*

No wonder over forty railroad systems have adopted the "National Lock Joint" Standard as the solution of their Culvert Renewal Problem.

CATALOGUE AND PRICES ON REQUEST

AMERICAN CASTING CO
Birmingham, Ala.
Chicago Office - Peoples Gas Building
New England Representative
Fred A. Houdlette & Son - Boston, Mass.
St. Louis Representative
H. P. Webb - - Wainwright Building
St. Paul Office
Contractor's Supply and Equipment Co.
Philadelphia Representative
Geo. H. Grone - Suite 700, Widener Bldg.

More Evidence of the Efficiency of Our Service Department

QUOTATIONS SUBJECT TO CHANGE WITHOUT NOTICE. ALL AGREEMENTS ARE CONTINGENT UPON STRIKES, ACCIDENTS AND OTHER DELAYS UNAVOIDABLE OR BEYOND OUR REASONABLE CONTROL.

Traylor Engineering and Manufacturing Co.
Crushing Rolls.
Gyratory and Jaw Crushers
Mining, Milling and Smelting Plants.
Cement Making Machinery.

CABLE ADDRESS: "TRAYLORIAN"
NEW YORK OFFICE 30 CHURCH ST.

CODES USED: WESTERN UNION, A.B.C., BEDFORD McNEILL.

WORKS: ALLENTOWN, PA

ADDRESS ALL CORRESPONDENCE TO THE COMPANY.

Allentown, Pa. March 31. 1917.

SUBJECT: Advertising.

Mr. A. F. Ashbacker, Mgr. Copy Service Dept.,
c/o Railway Maintenance Engineer,
Woolworth Building,
New York City, N. Y.

My dear Mr. Ashbacker:

Your favor of the 30th inst. and the layout for the page and two-page advertisements to appear in the April issue of the Maintenance Engineer came to hand this morning and the writer is forwarding the copy and necessary cuts for the two-page spread to your Chicago Office by Special Delivery today and trust that they will reach them in ample time to appear in the afore-said April issue.

I wish to thank you and Mr. Hoadley for your efforts in preparing these advertisements and to compliment you both on the exceptionally attractive get-up, also the way in which you have brought out the vital points of our crushing equipment. Certainly, if this copy does not pull sufficient replies to warrant us in continuing the use of the Maintenance Engineer as an advertising medium, I shall be very much surprised. It certainly is great copy.

I propose following this up with a very strong series of letters and other matter. The first of these letters will be made about the time that the Maintenance Engineer reaches the subscribers, and I feel that in connection with the two we should have some remarkable results and shall be highly disappointed if we don't.

This copy is such good work and everything done so nicely that I should like to have three thousand (3,000) copies of it struck off so that I may use it for circularizing, not only railroads, but also other people interested in stone crushing equipment. Kindly let me know what the charge will be for these three thousand prints.

With kindest regards, we are

Yours very truly,
TRAYLOR ENGINEERING & MFG. CO.,
Advertising Manager.

LAR/W

We make only a small charge for preparing advertising copy. Write to our nearest office for particulars.

Simmons-Boardman Publishing Company
New York Chicago Cleveland Washington